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Specifications—Bane or Boon

IT IS obvious that purchasing and manufacturing specifications for raw materials as well as finished goods have generally been of value in maintaining quality, but the writing of specifications as well as interpretation and application can, however, undergo considerable improvement. Specifications should not be written unless the requirements can be lucidly stated and met by those for whom they are written and it is equally important that methods for testing be available and specified. A specification calling for properties which cannot be accurately determined, places the supplier at the arbitrariness of the tester.

Specifications for thickness of coatings should refer either to average thickness or minimum and maximum thickness over significant and designated surfaces. This is particularly necessary when recessed portions of irregularly shaped work are to be plated, or when projecting parts must meet a maximum specification, as differences in thickness on these surfaces may vary from the average thickness by more than 500%. How often platers have been given irregularly shaped work to plate with a simple specification of "nickel plate .0005 inches" without clear designation of what surfaces are to be considered! The only way to clear the ambiguity of specification writing for plated coatings is to have them written by men who understand the mechanics of plating, the plating foreman, plating chemist or engineer who has studied current distribution and throwing power.

Specifications, even though well written, require intelligent application and interpretation. An example of unintelligent application occurred recently with an Eastern manufacturer of galvanized steel who had the steel rejected because it failed to pass the required number of dips in the Preece test (a test which I hope will soon be discarded for the more accurate methods now available). An investigation showed that there was sufficient zinc on the steel to doubly meet the specification but a surface contamination, difficult to remove, prevented the Preece solution from reacting with the zinc. The inspector's conscience was clear as the coating failed to meet the tests as specified and so the steel was rejected.

A common monopolistic artifice is to write seemingly innocuous clauses which restrict due to patent or other advantages, such as, for example, specifying the source of petroleum products or the manufacture of higher alcohols by enzyme action in contrast to synthesis. This practice can be obviated by sending the tentative specifications for criticism to all sources of supply rather than to a restricted number of suppliers.

There are definite limitations in specification writing for certain properties or classes of materials such as for example, surface finish, lustre and color of lacquers or enamels and, in these cases, resort to sample reference panels is usually made. Testing of materials can be carried to ridiculous and expensive rituals such as complete chemical analyses of metals in cases where only a simple physical test would suffice but these are usually the result of enthusiasm of novitiates as experience will gradually indicate the significant properties to be tested.

At Christmas Time

THE distress in Europe which is almost too overwhelming and near at hand to view in due perspective, should serve to focus our attention anew, at this time, on the need for the greater application of ethical and religious teachings both nationally and individually. One cannot help but be alarmed at the chaos of the present situations in China, Germany and Spain where the very basic fundamentals of religion, government and humanity have been abrogated. The world cannot forever continue plunging from crisis to crisis without a general conflict resulting from a nation or race of people fighting in desperation to maintain their existence.

In asking what we as individuals can do against the tide of millions, let us remember, "that policy, foreign as well as domestic, is for every nation ultimately determined by the character of her people and the inspiration of her leaders". Our insistence on a policy of honesty, faith, and respect in their lives and public acts would create the foundations for a lasting peace among the peoples of the world. Without these qualities, the strongest armaments, the most elaborate pacts only postpone the hour of reckoning. Leaders who preach class hate should be rejected as their philosophy is ultimately predicated to rule by force rather than reason. The conditions in Germany following the World War especially during the years of famine, as well as certain portions of the Versailles treaty formulated more by sentiment than by reason, laid the foundations for the rise of one who preached belligerence rather than a Gospel of Good Will. The transition from a democracy to a rigid intolerant dictatorship followed all too quickly. Collectively the citizens of nations have followed the inexorable paths of regimentation leading to misery, cruelty and death, although as individuals, humanity decries that such was not their will.

Let us here rejoice in keeping with the Spirit of Christmas, give humble thanks for the measure of freedom, peace and good will that we enjoy in these United States.

Metal Films

The protective action of invisible films imparts properties of tarnish and corrosion resistance to metals far in excess of those expected from a consideration of the inherent chemical nature of the metals themselves. The apparent tarnish resistance of chromium is, for example, due to the protective action of an extremely thin coating of chromium oxide approximately 10 Angstrom units thick and similarly, aluminum, owes its corrosion resistance to an invisible oxide film. The most strongly protectant coatings are usually the thinnest which is obvious when it is considered that films protective against the base metal must be highly protective against further growth per se. In addition, the most highly protective films are rapidly self healing so that when they are abraded thru to the base metal it immediately oxidizes to maintain the continuity and low permeability of the coating.

The refractoriness of the oxide films and their resistance to being dissolved or dispersed by chemical attack also influence the degree of protection afforded by the oxide films. Iron oxide or rust, for example, is non-protective due in part to its porous structure and susceptibility to chemical attack.

Man has been able to improve on the oxidation accomplished by nature by making artificially heavier and thicker coatings. This is accomplished for aluminum by electrical oxidation or anodizing and for silver by chemical oxidation in dichromate solutions. The search for non-tarnishing silverware has proceeded in several directions other than artificial oxidation. One method is to rhodium plate with minutely thin deposits, another is to alloy with other elements such as cadmium which are not as susceptible to sulfur discoloration as silver, and recently an interesting method has been proposed which involves coating of the silver with a very thin layer of aluminum deposited by cathodic spluttering, or vacuum volatilization after which artificial oxidation of the aluminum film may be accomplished to convert it into a translucent oxide.

One of the most beautiful metals is buffed zinc but unfortunately no method is yet known, other than by clear organic coatings, to protect buffed zinc surfaces from losing their luster.

Commercial aluminum and its alloys are being anodized in large tonnage to obtain better corrosion resistance, and anodized high purity aluminum is being used in reflectors with almost permanently high reflectivity.

Reflectors with high constant specular reflectivity are necessary for television receivers and to date, rhodium coated silver plated reflectors, and aluminum and chromium mirrors deposited in vacuo have proved most satisfactory.

Passivation of metal surfaces has been a boon to mankind by making possible the utilization of metals for uses where their ordinary corrosion resistance would mitigate against their use.

Activated Carbon in Electroplating Solutions

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The use of activated carbon for removal of colloidal impurities in bright nickel plating solutions is discussed. Technique for filtration with activated carbon together with specifications for the same are presented. Activated carbon is an adjunct to filter-aids and not a substitute.—Ed.

Introduction

THERE has recently been a considerable amount of interest in the use of activated carbon for electroplating solutions, particularly in connection with bright nickel plating. It is timely, therefore, to consider what role activated carbon may have in the plating industry.

In general, the function of activated carbon is the removal from liquids of those impurities which because of their physical and chemical nature, are not removable by mechanical processes such as ordinary filtration. Among impurities of this type may be listed organic color bodies, dissolved substances causing undesirable tastes and odors, and many substances in colloidal dispersion which cause haze, cloudiness, slow precipitation, or deposition of undesirable films on solids immersed into the liquid.

Activated carbon is used on a large scale for color removal in sugar refining, and also in the refining of many chemicals, and of food products such as pectin, gelatin and vinegar. In many of these applications, undesirable colloidal material is also removed. In the conditioning of wines, and in the purification of water, activated carbon removes foreign tastes and odors.

The process of activating carbon is primarily a heat treatment under carefully controlled conditions, whereby the carbon is given a highly porous structure consisting of a net-work of capillaries or passageways. The surface of this internal net-work is of such nature that when the carbon is introduced into a liquid containing impurities of the type described above, the impurities adhere to this surface and are firmly retained thereon. Purification with activated carbon is therefore a process of removing impurities, bodily and permanently, from the liquid.

Bright Nickel Plating

The maintenance of a bright nickel plating bath in proper condition for obtaining a bright, permanently adherent deposit of nickel, presents problems for which the use of a suitable activated carbon affords a logical solution.

The delicacy of operation involved in bright nickel plating is perhaps not always fully appreciated. Success depends upon controlling the operation in such a way that nickel is placed, molecule by molecule, side by side, at a uniform rate over the plating surface, in an essentially continuous film which is built up layer by molecular layer. There must be nothing to interfere with even deposition on every part of the surface and there must be no growth of large nickel crystals.

Human control of this operation is of necessity indirect and at a distance. Primary control consists in operation of the plating bath within predetermined limits of temperature, pH, voltage and current density.

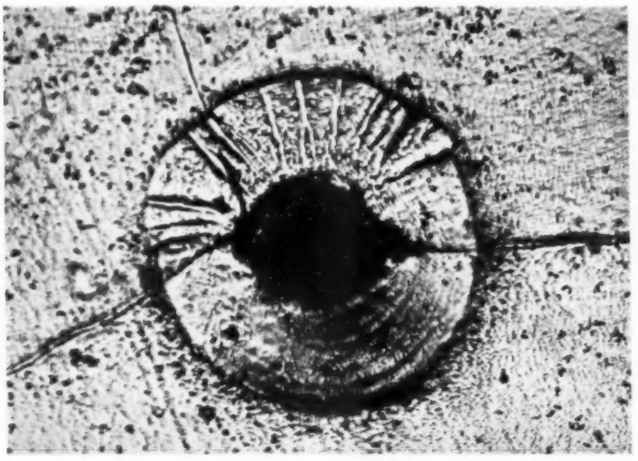
However, these essentially manually controlled operations do not suffice to insure proper conditions at the actual scene of action, which is the plating surface. No manual operation can possibly be delicate enough for even spacing of the minute crystals of nickel metal, nor for the prevention of non-uniform crystal growth in localized areas. This control task is entrusted to a brightening agent, introduced into the plating bath, which because of its physical and chemical nature, has the property of causing the nickel ions to deposit in an orderly, even fashion upon the plating surface.

The brightening agent is the traffic policeman of the plating surface.

However, another type of policeman is also needed at this surface. No foreign substance, such as hydrogen bubbles or particles of suspended matter, must be permitted to loiter there; their presence would cause a pitted appearance in the finished work. An anti-pitting agent is therefore added to the plating bath; such agents being similar to soap in lowering surface tension, and in effect, make the plating surface so slippery that hydrogen bubbles, instead of adhering, slide up by virtue of their buoyancy, and solid particles slide down to the bottom of the tank.

The anti-pitting agent is the patrolman of the plating surface, cooperating with the brightening agent by keeping the way clear for uninterrupted flow of proper traffic.

A correctly prepared bath, with the right temperature, pH, voltage, current density, anode composition, etc., should give good results—but unfortunately this is not always the case. Frequently, after all known factors have been carefully checked, trouble persists.



Pit in nickel deposit from hydrogen discharging on filterable impurities with low hydrogen overvoltage. Mag. 500*x W.R.M.*

In many instances, such troubles may arise from undesirable aliens in the plating solution, causing major or minor "riots" at the plating surface. These aliens may be excessive suspended matter, a trace of lubricating oil, traces of organic matter from rubber tank linings, or even degradation products of the brightening and anti-pitting agents, reverting to a colloidal state of dispersion. Any one of these aliens may, by spreading as a film on the plating surface, disrupt the orderly flow of traffic of nickel from electrolyte to the plating surface.

To forestall such occurrences, an immigration service is necessary. As a first line of defense against accumulation of easily recognized villains such as readily visible suspended matter in excessive amount, ordinary filtration makes a very efficient immigration officer.

Ordinary filtration, however, is powerless in restraining the more insidious type of alien—the film-forming traces of lubricating oil, rubber vulcanizing compounds, and colloidal degradation products. The only way to prevent them from spreading on the plating surface is to catch them on the internal net-work surfaces of activated carbon, which holds them prisoners.

And, since these insidious aliens may strike without warning, it is well to have activated carbon on duty as an immigration officer at all times.

Technique for Use of Activated Carbon

The application of activated carbon for the continuous purification of plating solutions is very simple. Briefly, it comprises circulating the solution through a layer of activated carbon deposited upon a filter, which may be either a filter press or a filter of the cylindrical tank type.

The carbon is deposited as a "pre-coat" on the filter. To do this, a slurry is made of the carbon with water or plating solution, containing not more than one pound of carbon per gallon of liquid. This slurry, in a small container of suitable capacity, is picked up by the suction side of the pump serving the filter. The discharge from the filter is run back into the slurry container and pumping is continued until all the carbon has been transferred to the filter.

The amount of carbon to be used is determined by the solids capacity of the filter. This can be calculated from the filter surface area, and the thickness of the space provided in each compartment of the filter for the accumulation of filter cake. For example, in a filter press having six 12″ x 12″ x ¾″ frames, the total filter surface area is 12 x 12 x 6 x 2=1728, square inches (the factor 2 is used because both sides of each frame represent filtration surfaces). The maximum thickness of filter cake which can be deposited on one side of a plate is half the thickness of the frame separating it from the next plate, or ⅜″. The solids capacity of the filter is therefore 1728 x ⅜=648 cubic inches.

The amount of carbon to be used should be sufficient to fill about three-quarters of the available cake space, which in the case of the example cited, would be 486 cu. in. The grade of carbon commonly used for bright nickel solutions occupies approximately ¼ oz. per cu. in. in the form of filter cake. 486 cu. in. therefore require 122 oz., or just over 7½ lb. of carbon.

The amount of liquid (water or plating solution) to be used in making the carbon slurry, should be sufficient to fill the filter, auxiliary pipe lines and pump, plus an excess of 10%, to insure that the pump will not suck air from the slurry container. If this amount of liquid is insufficient to provide one gallon for each pound of carbon used, add sufficient additional liquid to thin the slurry to this point. If on the other hand, the amount of liquid needed to fill the filter, pump, etc. plus 10% excess, is greater than is needed to give a slurry of one pound of carbon per gallon, no adjustment need be made. The slurry should not be heavier than one pound of carbon per gallon, but may be lighter if necessary.

When a carbon pre-coat is deposited as described above upon a filter dressed with the heavy filter paper used in many plating filters, the carbon is well retained in the filter, and no additional precautions need be taken to prevent carbon from passing into the plating tank—a condition which would of course be undesirable.

If filter paper is not used, it is best to put a preliminary pre-coat of diatomaceous filter powder on the filter. The procedure for this is the same as that for pre-coating with carbon; the amount of filter-aid to be used should be one-

fourth to one-eighth the thickness of the total cake deposited. The density of most filter powders of this type, in the form of filter cake, is approximately 12—15 lb. per cu. ft. (0.11 to 0.14 oz. per cu. in.).

The carbon is deposited on top of the filter powder precoat, which serves as the retaining medium.

After deposition of the carbon upon the filter, the suction of the pump is put on the bright nickel bath itself, the plating solution being circulated through the filter and back into the tank. To avoid short-circuiting (filtration of only a localized portion of the plating bath), it is well to have the return line from the filter at a diagonally opposite corner of the tank from the suction line, with the suction removing liquid from near the bottom of the tank, and the return line discharging just under the surface of the solution.

The rate of circulation through the filter should preferably not exceed 25 gallons per hour for each square foot of effective filter area. Lower rates are permissible and even desirable, because they not only permit a more effective contact between carbon and plating solution, but also make it possible to operate the pump at lower pressures and consequently at somewhat lower power consumption. Since for continuous safe-guarding of the plating solution, continuous filtration through activated carbon is recommended, the power consumption factor may be worth considering.

Specifications for Activated Carbon

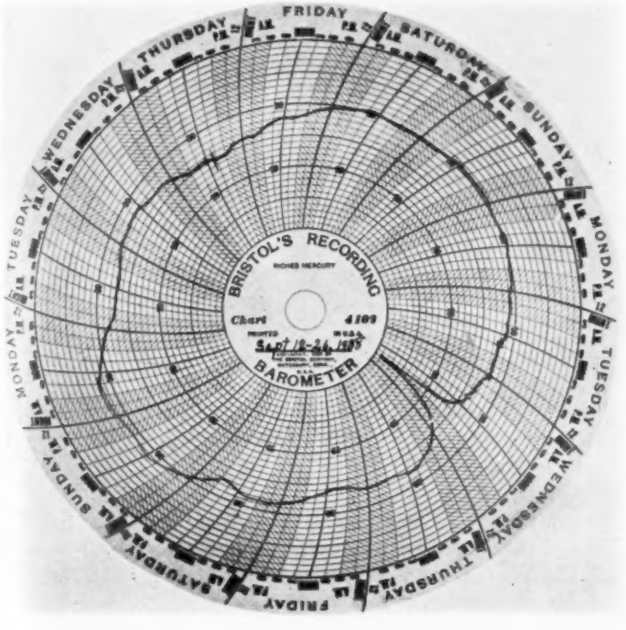
Activated carbon intended for use on electroplating solutions, should meet certain physical specifications. First of all, it should be a carbon which has been carefully acid-washed to free it of objectionable soluble matter, such as iron, sulphides and alkalies. After acid-washing, it should be washed back to near-neutrality, to remove acid ions which may be undesirable. A water extract of the carbon should show a pH of 5.0—6.0.

Secondly, it should not be ground to excessive fineness, as retention in the filter is very important and excessively fine particles passing into the plating tank are highly undesirable. A carbon ground so that not over 60% will pass a 300 mesh sieve is satisfactory.

Third, the carbon should have a high bulk density in the form of filter press cake so as to permit a maximum weight of carbon to be deposited and thus afford maximum adsorptive surface and maximum protection against trouble-making impurities. Filter-press cake density is closely equal numerically to "apparent density", a value which is obtained by measuring the volume of a weighed amount of dry carbon sample in a glass-stoppered graduated cylinder, after the cylinder has been tapped sufficiently to bring the carbon to minimum volume. The weight of carbon divided by this minimum volume is the apparent density. A carbon suitable for electroplating solutions should have an apparent density of 0.40 to 0.45, equivalent to 25—28 lb. per cu. ft.

In general, it is more economical to use activated carbon filtration continuously, putting a small load on the carbon over an extended time, than to wait for the occurrence of trouble and the accompanying expense of lost production time, trouble-shooting, and a large impurity load for the carbon. The presence of trouble-making impurities is indicated in most cases only by defective plating as they are not detectable in advance, and in fact, are often not detectable or identifiable even when trouble does occur. Not all trouble-making impurities are removable with activated carbon, but those which have a tendency to form interfering films on the plating surface are precisely the ones which are readily trapped as films on the adsorbing surface of activated carbon.

Barometer Chart of Hurricane



A recording barometer, operated by a spring-driven clock and mounted in the factory of the Bristol Co., Waterbury, Conn., predicted and faithfully charted the recent hurricane which swooped down on New England with devastating suddenness on the afternoon of Sept 21, 1938.

Equipped with a 14-day chart, this instrument continually recorded barometric pressure readings beginning Monday, Sept. 12 at 8 AM. With the exception of a low point of 29.50 inches from 6 AM to 6 PM, the following Thursday, the 15th, the graph showed a comparatively steady atmospheric pressure of 30.00 inches until 1 AM Wednesday, September 21, the day of the hurricane. Then the barometer began to act with a vengeance. From a high of 29.80 inches at that hour, the line dropped at high noon thirty hundredths of an inch to 29.50. And from noon to 6 PM there was chronicled on this barometer chart a drop in pressure to a point never before reported in the Waterbury, Conn., territory. In fact, the pressure line plummeted so deeply that it almost dropped off the calibrated portion of the chart! Six hours later this pressure rose to 29.50 inches and by 9 AM the next day, September 22, it was back to normal. This chart, invaluable from a meteorological standpoint, will of course, be preserved. The fact that the instrument making this record was powered by a spring-driven clock, enabled it to chart the atmospheric fluctuations throughout the entire storm.

Filter Aids for Filtration of Electroplating Solutions

By Richard J. Amberg*

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Filter aids assist filtration by increasing the flow rate and improving the clarity of the filtrate. Used as a precoat, the filter aid transfers the filtering surface from the filter cloth or screen to its own surface, minimizing clogging and allowing longer cycles of filtration between cleaning. Directions for the use of filter aids are given.

Introduction

FILTRATION, by way of introduction, is usually thought of as the removal of solid particles from a liquid medium. It usually entails a closed pressure system in which the liquid is forced through a cloth or metal screen. Before considering the application of filter aids, let us consider just why we filter a plating solution in the first place.

That the presence of dirt, grit, metallic particles, impurities from anodes or any extraneous solid matter impairs the quality of the plated object is probably only too well known. Their presence means surface roughness and that usually means an increase in buffing effort with probable subsequent pitting and pin-holes. If the plated object is not buffed, its surface smoothness will depend upon a clear, clean solution.

Cost of Filter Aid

Assuming that a dirty solution is detrimental to the quality of the work, we are next faced with the economic question of whether the installation of a filter will improve the quality to such an extent that it is a worthwhile investment. One estimate of the cost of filtering a solution at the rate of 40 gal. per hour costs 30 cents per day and the cost for an 8000 gal./hour filtration was figured at $3.00 per day, these cost figures including maintenance, power, labor, repairs, filter aid, all operating charges, insurance, amortization, interest, taxes, and all other owning costs. While probably optimistic to a certain extent, these figures do give some idea of how cheaply a filtration process may be operated. Compared to the time, trouble and labor involved in cleaning a heavy deposit of mud and slime from the bottom of the plating tank with the probable loss of solution, filtration certainly appears to be an indispensible part of the plating process.

Functions of Filter Aid

Assuming that we have decided filtration necessary, another question may be raised. Why use a filter aid? Unless some benefit or benefits, which at least balance the expense and trouble involved in its use are derived from filter aid, don't use such a material. However, it so happens that most filters for plating solutions are designed by the manufacturer to be used in conjunction with filter aid. On the other hand, the type of solids being filtered from a particular solution may be such that no filter aid is necessary. In such a case, we would certainly not recommend its use. At any rate, the results that can be and have been obtained are such that any one who hasn't tried filter aid cannot afford to pass up this possible opportunity to improve his process.

Effect of insoluble matter on heavy nickel deposits. Mag. 500x W.R.M.

*Abstracted from Monthly Review, XXV, No. 9, 741-747.

Filter aids are used for four definite reasons. First, their use permits a higher flow rate through the filter. Second, longer cycles between cleaning are obtained. Third, a high variable degree of clarity in the filtrate can be secured, variable in that there are several different grades of various particle size which give varying degrees of brightness to the filtrate. Fourth, through its use as a precoat, longer cloth life can be had. This property alone oftentimes more than pays for the powder necessary for precoating.

To explain why higher flow rates are obtained let us consider how this material functions. If added continuously, as it should be, to solution going into the filter there is built up a porous, yet firm, cake in which each particle of slime and dirt is more or less isolated by a particle of diatomaceous earth. The very nature of the material makes this possible. The particles are so varied in size and shape and present such a tremendous surface area that a regular lattice-work is built up and through these microscopic channels the solution, under pressure, must find its way until it eventually reaches the filter-cloth in a clarified state. In most cases, if the filter aid were not present the dirt would slime over the surface of the filtering medium and form an impervious mass, which would not permit the easy passage of the solution. This is exactly what has happened if, when you find it necessary to clean your filter because the pressure has reached its maximum, there is not a firm cake completely filling the cake space. And, because the cake built up is porous, the filter will run for a greater length of time before cleaning is necessary.

We mentioned a high and variable degree of clarity. Through different methods of processing and controlling of particle size, we are able to produce several different grades of filter aids which act differently in the body of the filter. Clarity and flow rate, however, are usually, but not always, inversely proportional to one another. That is, a high degree of clarity is usually obtained at a sacrifice in flow rate and vice versa. This relationship is true up to the point where the cake becomes so porous that the particles to be filtered pass thru the filter aid and slime over the retaining surface but this, however, is an extreme case. The most efficient and economical grade to use is the one which will give the highest flow rate with the desired degree of clarity.

Directions for Use of Filter Aid

We mentioned the use of the precoat as a means for protecting the filter cloth or screen. The precoat is a thin layer of filter aid applied directly to the cloth in previously filtered solution, or, if dilution is inconsequential, in water. The proper amount of powder is simply stirred into the precoating liquid and pumped into the body of the filter.

The quantity of liquid necessary for precoating is simply enough to completely fill the body of the filter, the pump, and intermediate lines leaving sufficient liquid in the precoating tank to prevent the pump from sucking air. The filtrate is returned to the precoating tank until all the powder is in the filter. Mild agitation is necessary to prevent the filter aid from settling. Usually the return line from the filter may be placed in the tank in such a way as to set up a whirling motion, thus eliminating the necessity of manual agitation. If mechanical agitation is used, a paddle revolving at the rate of 15 revolutions per minute is sufficient to keep the powder in suspension.

Concerning the proper amount of powder to use for precoating, we have found that quantities equivalent to 10 pounds per hundred square feet of filtering area will give a precoat one-sixteenth inch thick, and this thickness is usually enough. The precoat should be applied as fast as possible to ensure complete coverage of the filter cloth from top to bottom. Precoating is usually accomplished with but very little pressure on the filter, as indicated by the gauge.

The amount of filter aid to be used in the main body of solution normally amounts to from 0.1% to 0.5% based on the weight of solution. Thus, the amount in a batch of 100 gallons would be roughly between one and four pounds. The proper amount to use varies with the type of solution and may vary from plant to plant on the same solution. One thing to bear in mind, however, is that the presence of an amount of filter aid greatly in excess of the proper amount does not materially increase the flow rate and only serves to fill the cake space more rapidly than otherwise, thereby reducing the length of cycle. For one case studied, the rate of flow was at its optimum point with respect to the percentage of filter aid in the range between 0.4% and 0.6%. It can be clearly seen that increasing the amount of filter aid beyond 0.6% does not increase the flow rate to any great extent. Also, using less than 0.4% does not give an efficient rate of flow.

Whether the filtration process is continuous or batchwise, the solution going into the filter should be homogeneous as far as the filter aid is concerned. That is, a gallon of solution going into the filter at the start of the run should contain as much filter aid as a gallon entering near the end of the run. Operation in this manner insures a uniformly porous filter cake and best efficiency from the filter. It does, however, require some additional equipment, usually inexpensive.

To summarize briefly, we find that diatomaceous earth is used to assist filtration by increasing the flow rate and improving the clarity of the filtrate. Through its use as a precoat, the filter aid transfers the filtering surface from the filter cloth or screen to its own surface, thus protecting and increasing the life of that cloth or screen. Likewise, small additions to the batch keep the cake formed open and porous permitting longer cycles between cleaning. The filter aid is an industrial material used for a definite purpose and, if used intelligently, will provide a return on the investment far in excess of its original cost.

Methods of Mixing

Filter Aids With Plating Solutions

By Dr. Walter Meyer

Editor, Metal Industry

Methods for metering of filter aids and activated carbon to plating solutions are described. Additions throughout the course of continuous filtration will enable the most efficacious use to be made of filter aids.

In order to make the most judicious use of the filter aids and activated carbon for filtering plating solutions, these materials should be metered to the plating solution so that all portions of the solutions being filtered are treated with approximately equal portions of filter aid or activated carbon. It is evident that when the filter aid is merely applied as a coating upon the walls of the filter a sharp concentration gradient of impurities will result with the outer portion of the cake being highly contaminated with impurities, and the portion of the cakes adjacent to the filter wall would not be utilized to its full effectiveness.

One method of utilizing filter aids is to pump the entire plating solution into an auxiliary tank, adding the filter aid directly to the solution and filtering back into the plating tank using a previously pre-coated filter. The filter aid should be well stirred by hand paddles or mechanical agitation to prevent settling. This method allows the thorough cleaning of the tank of heavy sludge and work which has fallen off the plating racks but it obviously interrupts the plating schedule and entails an unnecessarily large waste of space for the auxiliary tank.

Another system for using filter aids embodies the use of a separate tank smaller than the plating tank, the transfer of solution being effected by syphoning. (See Figure I). The filter aid is introduced into the open head auxiliary tank which may be stirred either mechanically or by hand. The solution and filter aid are then drawn by a pump to a filter and the clear solution returned to the plating tank. The mixing container should be blocked up to the same level as the plating tank to prevent overflow from syphoning. The filter should not run at a faster speed than the syphon flow so as to maintain a level in the mixing container close to that in the plating

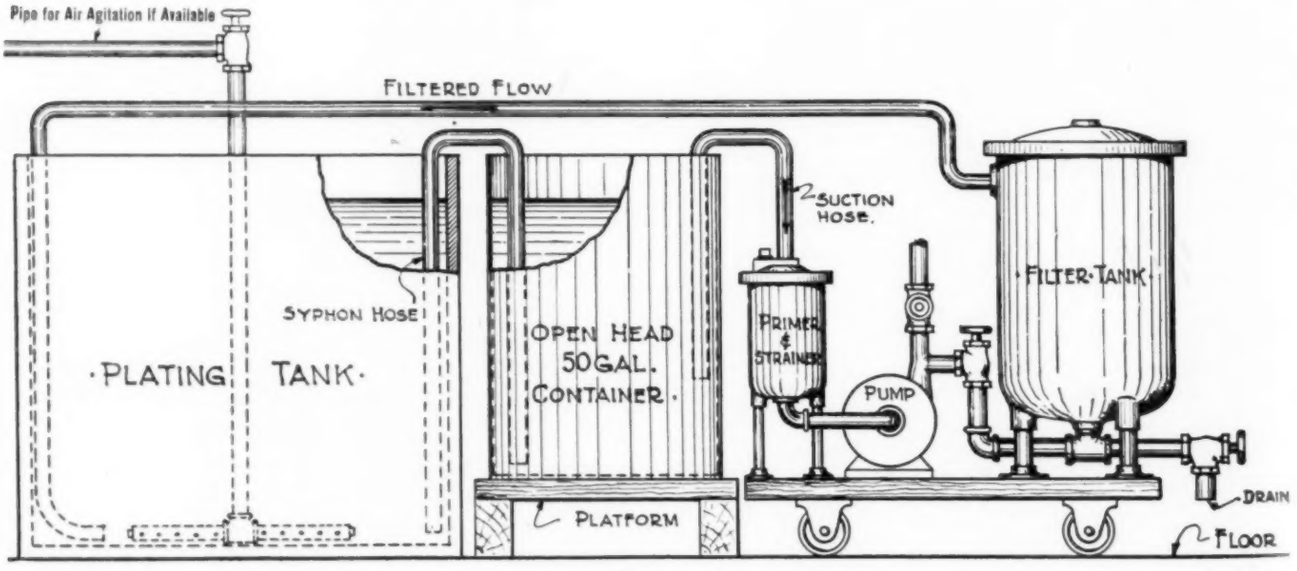


FIGURE I

Auxiliary tank method of mixing filter aids with plating solutions

(Courtesy of The Industrial Filter and Pump Mfg. Co.)

tank. The following sizes of hose are required for different flow rates using 10 ft. lengths.

Rate of Filtration	Bore Size of Hose
400 gallons per hour	1-1¼″
700 gallons per hour	1-1½″
1000 gallons per hour	1-2″

When larger capacities are required, double suction control can be installed on the pump or another syphon hose added to equal the capacity of the filter. Stiff hoses should be used to prevent collapsing. The following amounts of filter aid are recommended to maintain maximum flow rates and to insure fine filtration of riled, slimy nickel or cyanide solutions:

Filtration Rate	Filter Aid Required Per Hour
400 gallons per hour	1½ lb.
1000 gallons per hour	4 lb.
1500 gallons per hour	5 lb.
2000 gallons per hour	6 lb.

FIGURE II

Apparatus for automatically metering filter aids to plating solutions

(Courtesy of The Industrial Filter and Pump Mfg. Co.)

An efficient device for automatically metering filter powder or activated carbon to plating solutions for continuous filtration is illustrated in Figure II. The hopper for the powder can feed at any rate desired from ½ lb. per hour up. The filter powder drops to the mixing tank through a glass tube which permits easy observance of the rate of feed.

The mixing tank level should be the same as the plating solution as the mixing tank is fed with flow through a syphon hose from the plating tank to an inlet on the bottom of the mixing tank. The filter aid is thoroughly mixed with the plating solution by a propeller which is powered by the feeding mechanism. For cyanide solutions, iron and steel fittings and tanks are used, and for acid solutions, rubber or lead linings with rubber or lead coated fittings and valves are used.

Continuous filtration apparatus can be arranged in series with a heat exchanger for external heating or cooling of the plating solution. This system eliminates heating or cooling coils in the plating solution itself, allowing more space between anodes and cathodes for the same size of tank, and the elimination of coils also permits more thorough cleaning of the solution because of the removal of places for the dirt to lodge. By-passes should be installed to provide for heating or cooling without filtration if it is so desired. Filtration practice is becoming increasingly necessary for high speed and bright plating of, for example, copper, nickel and zinc and the more general use of filtration has been retarded by the failure to realize full efficiency from filters because of the non-use of filter aids. It is hoped that the preceding pages will, in some measure, contribute to their wider utilization. I have visited scores of plating plants possessing excellent filters which were not used because of difficulty with clogging of the filtering surfaces and the attendant expense and trouble of frequent cleaning. The use of filter aids will remedy these difficulties. It is a pity that archaic solutions and operating conditions are employed when filter aids and filtration would enable the use of warmer solutions with higher current densities and correspondingly brighter, smoother and more easily buffed deposits.

Plating control and conditioning equipments are developed and ready to aid in a renaissance of plating technique which will definitely result in increased economy and quality so necessary in competition with clad metals, hot dipping processes and alloys.

Acknowledgment of the kind assistance rendered by *T. Lundberg* of *The Industrial Filter and Pump Mfg. Company*, Chicago, Ill., in the preparation of this article and for the illustrations used herein, is gratefully given.—W. R. M.

A Study of

Cyanide Copper Plating Baths

By Dr. C. B. F. Young and Gerald Reid

Head of Institute of Electrochemistry and Metallurgy, N. Y., Consultant; and Student, Columbia University, respectively

A study of the effects of variations in pH, temperature, current density and concentration in cyanide copper solutions.—Ed.

IN THE past year or so, much has been published concerning the cyanide copper baths. Different materials have been added to the ordinary solutions in order to increase the current density, produce smoother deposits, etc. A good example of such a compound is Rochelle salt.

Copper plating baths are indispensible in the present plating plants because the material is soft, plates fast and can be polished to a high finish. It is therefore ideal for certain types of undercoatings, especially where the base metal is hard and rough, like steel. After plating a heavy deposit, the copper can be buffed much more easily and cheaply than steel.

From the electromotive series, one can see that steel is more active than copper and the former will displace the latter if it is placed in a solution containing a great amount of cupric or cuprous ions. For this reason it is necessary first to use a solution which does not give rise to many copper ions. This eliminates the cupric sulfate bath for plating directly upon steel. However, it is possible to deposit a thin film of this element from a cyanide bath and then transfer the object being plated to an acid copper bath. This procedure is expensive due to the labor and time involved in transferring the work from one tank to another. The "dragout" will also be larger due to the two dips used. Thus research has tried to develop methods of overcoming the combination method. The fast plating quality of the acid bath makes its use desirable. With an increase of the current density of the cyanide bath there is a possibility of using this alone and saving an operation.

As stated above, the cyanide bath can be used very effectively for plating steel as no copper is deposited by immersion. This is due to the fact that the copper ions (Cu+) are kept at a minimum. The ordinary cyanide bath has several handicaps, among which are slow plating and low cathode efficiencies. If it were possible to overcome these, the cyanide copper bath would be even more valuable than it is at present.

Theoretically, the cyanide copper bath should plate faster than the acid copper solution due to the fact that the former has only one positive charge which has to be neutralized while the latter has two. See data below:

Element	*Valence*	*Electrochemical Equivalent (Grams per coulomb)*
Copper	Cu+	0.0006588
Copper	Cu++	0.0003294

Thus, for every faraday of electricity passed through a cyanide solution, 63.57 grams of copper should be deposited while the sulfate should only give 31.75 grams. However, in practice it will generally be found that the ordinary cyanide copper baths give about 50-75% of this figure, but the acid copper will give 90-95% of the amount indicated above. Thus, the two baths produce practically the same amount of metal per faraday. Furthermore, a higher current density can be used with acid copper baths which makes it a faster plating solution. If it is possible to increase the efficiency of the bath and the current density at which it is used, one can see that it will have several advantages over the acid bath.

One method of increasing the current density is to increase the metal content of the bath. In this way metal ions will be supplied to the cathode area at a faster speed than heretofore, permitting thereby a higher current density to be used.

It is interesting to note that *Dr. L. C. Pan* undoubtedly had these ideas several years ago.[1] In the paper referred to in the reference, the author showed that if the metal content of a copper cyanide solution be increased, a higher current density could be used. He also proved that as the metal content was increased the cathode efficiency increased. Thus with a bath containing:

	g/l	*oz./gal.*
Copper cyanide, CuCN	89.6	12
Sodium cyanide, NaCN	106.2	14.1
Free cyanide, NaCN	8.2	1.1
Sodium carbonate, Na_2CO_3	78.0	10.4

and used at room temperature and 18.5 amperes/sq. ft. the anode efficiency was 75.5%, while the cathode efficiency was 95.0%. Pan also found the following:

[1] "Concentrated Copper Cyanide Plating Baths", Trans. A.E.S., 68, pp. 471-482 (1935).

Voltage across Haring cell. 4.6 volts
Cathode deposit ..... Smooth, matte
Anode appearance ..... Blue coloration, re-dissolving
Anode polarization ..... 1.55 volts
Cathode polarization ..... 0.85 volts
Resistivity of electrolyte ... 7 ohms/cm[3]
Throwing power 47.4%

From the above data it can be seen that this bath has many favorable properties. Due to its high cathode efficiency and the cuprous condition of copper in the cyanide, this solution will plate almost twice as fast as the ordinary acid copper solution provided both are used at the same current density, which, in this case is 20 amps./sq. ft. This bath has been used at twice this current density with good results.

Another good point in favor of the cyanide bath is the throwing power. With the concentrated bath it is around 48%, while with the sulfate bath it is below 10%.

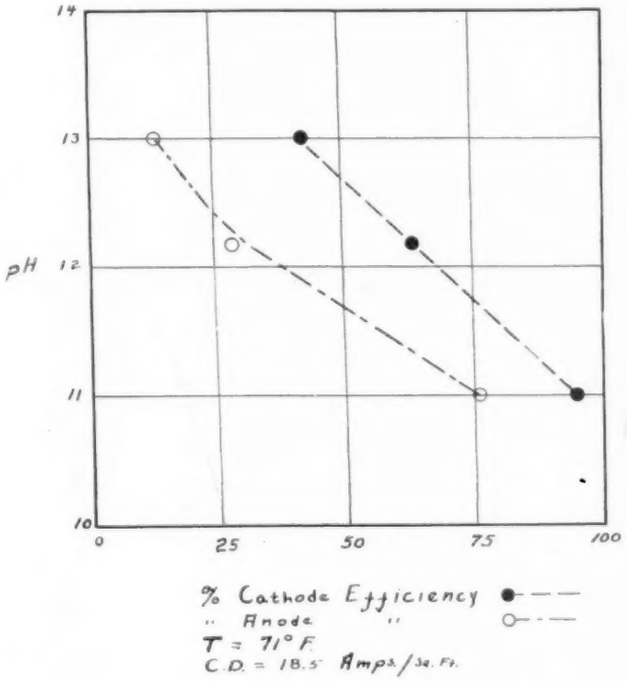


FIGURE 1

In the present paper, it was the desire of the authors to investigate the "Pan Bath" more fully, especially in regard to some variables, such as: current density, temperature, pH cell voltage, anode efficiency and cathode efficiency. The effects on anode appearance and cathode appearance were noted.

It will be seen that the present paper includes the pH of the solution. Pan did not check this, possibly due to the fact that the effect of the hydrogen ion concentration on alkaline plating solutions had not been recognized fully at that time.[2] Three pH ranges were used, namely 11, 12.2 and 13. A pH of 11 gave the best results. Sodium hydroxide was used to increase the pH in all

[2]For the first published discussion of pH of cyanide copper solutions see "The pH of Alkaline Plating Solutions" by G. B. Hogaboom, read before the New York Convention of the A.E.S., 1937; published in Metal Industry, March and April, 1938.

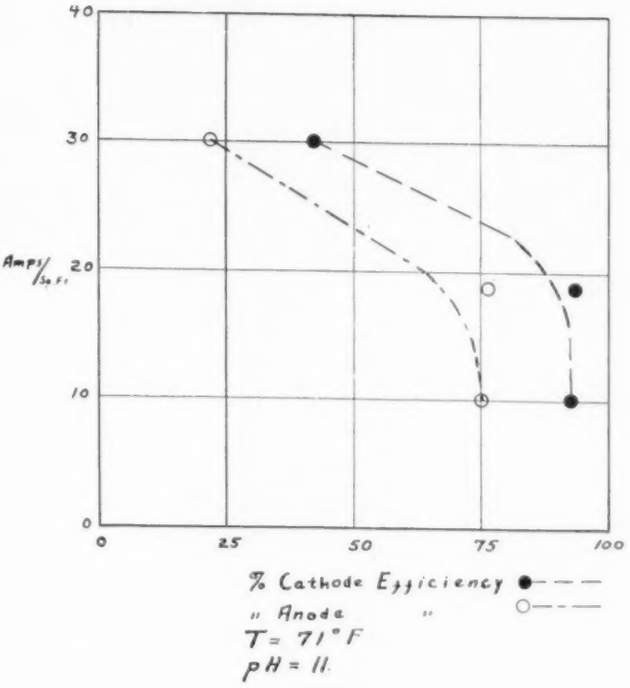


FIGURE 2

cases. It was found that an addition of sodium cyanide did not appreciably increase the pH of the solution. Approximately 5.5 gm/l of NaOH was required to change the pH from 12.2 to 13.

By referring back to Table I, it will be noted that the potential drop across the solution was inversely proportional to the pH. The cell voltage decreased as the pH increased. From Graphs No. 1, No. 2, and No. 3, it is easy to see that the cathode efficiency decreases rapidly as the pH is increased above 11. The efficiency remains constant as long as the current density remains under 20

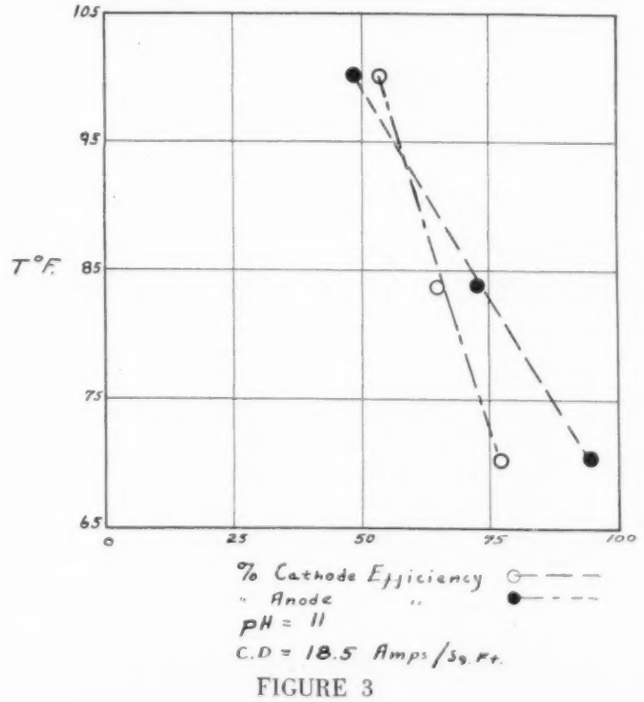


FIGURE 3

TABLE I

CONCENTRATED COPPER CYANIDE PLATING SOLUTION

Amps./ Sq. Ft.	F°	pH	Voltage	Anode Eff.	Cathode Eff.	Anode Appearance	Cathode Appearance
10	71	11	4.9	75%	89.4%	Blue coloration forms on anode after first min. of plating. Then it starts to roll off into soln. After a few min. the anode was once more clean.	Smooth, adhering, hard, matte plate.
10	100	11	3	75%	96%	Clean throughout the whole process of plating.	Smooth, adhering plate.
18.5	71	11	4.9	75.4%	91.0%	Blue coloration first 2 min. which then starts to roll off the anode into soln. The anode is clean after the plating.	Smooth, hard, adhering plate.
18.5	71	12.2	5.3	28.6%	58.8%	Dark, heavy green coloration forms on anode. It then starts to roll off the anode into soln. The anode is clean after the plating.	Smooth, hard, adhering plate.
18.5	71	13	4.7	13.4%	43.0%	A dark heavy green coloration forms on anode. After anode comes out of soln. it is still green.	Smooth, hard, adhering plate.
18.5	100	11	3	54.6%	49.8%	Anode turns green then color starts to roll off. Anode comes out clean after plating.	Smooth, hard, adhering plate.
18.5	100	12.2	4.55	42.4%	56.4%	Anode turns green and the color starts to roll off. Anode comes out clean.	Smooth, hard, adhering plate.
30	71	11	5.7	23.4%	41.9%	Blue coloration at first 2 min., which starts to roll off into soln. The anode is clean after plating.	Smooth, hard, adhering plate.
30	100	11	5.6	32.4%	32.1%	A dark, heavy blue coloration forms at the anode at first 2 min., which starts to roll off. Anode clean after plating.	Smooth, hard, adhering plate.

L. C. PAN (Concentrated Copper Cyanide Plating Solution[1])

28.5	71	11 (app.)	4.6	75.5%	95.0%	Blue coloration. Immediately soluble in electrolyte.	Smooth, matte.

Anode Polarization	Cathode Polarization	Resistivity of Electrolyte
1.55 volts	0.85 volts	7 ohms/cm³

amperes/sq. ft. After this current density is reached, there is a rapid decrease in efficiency. In Figures 1 and 2, it will be seen that the cathode efficiency is higher than the anode efficiency. From Figure 3 this is the case at lower temperature, but not at the higher ones. In fact at approximately 93° F. the two are equal. This, however, is the only exception. Undoubtedly this is due to the fact that as the temperature becomes higher, the chemicals in the bath attack the anode, dissolving it more rapidly, thereby increasing the anode efficiency. From the graphs, one would be safe in saying (with one exception) that the metallic content of the solution would decrease with continued use of the bath. Also, the pH of the bath would decrease because the hydrogen ion concentration would be increased. This would be augmented also by the loss of metal due to "drag out," which will be greater than the ordinary cyanide copper due to the higher concentration.

Conclusions

The concentrated cyanide bath is suitable for electroplating plants. The following formula may be used and will produce good results:

CuCN	12 oz./gal.
NaCN	14 oz./gal.
Na_2CO_3	10.5 oz./gal.
Temperature	70 deg. F.
Current density up to 20 amps./sq. ft.	
Anode efficiency	75%
Cathode efficiency	91%
pH	11
(determined with paper strips)	

Tellurium Lead for Plating and Pickling Equipment

By G. O. Hiers and G. A. Steers

National Lead Co., N. Y.

The addition of small amounts of tellurium to lead results in increased fatigue and chemical resistance. Tellurium lead has proved to give greater life to plating and pickling tanks than chemical lead. The cold working properties and the comparative grain growths of various leads are also discussed. The surprising ability of tellurium lead to be cold worked proves to be an advantage in preventing ballooning of lead heating coils.—Ed.

IN RECENT years, tellurium lead has been used with increasing frequency for linings, heating coils, anodes and other purposes in plating and pickling equipment. Its performance has aroused considerable interest among those responsible for the maintenance of this type of equipment. In any number of cases, it has demonstrated an increased resistance to corrosion, longer life under vibratory stress and mechanical strain, and a much improved resistance to the corrosion-fatigue type of failure.

Background and Composition

Tellurium lead was developed by two British research men whose work grew out of a series of studies made in this country and abroad on the changes effected in lead by the addition of small amounts of other metals. For the most part, these studies were of interest chiefly to laboratory men. The quantity of alloying metal usually added was relatively large and tended to impair some of the desirable properties of the chief metal.

To the non-technical man, one of the interesting features about tellurium lead is the fact that it is a practically pure lead. Its special properties are obtained by the addition of less than 0.1% of tellurium to regular chemical lead. This minute quantity of tellurium does not affect the malleability, pliability or other desirable qualities of ordinary lead to any considerable degree. On the other hand, it does produce a marked change in grain formation. It raises the recrystallization temperature and tends to retard grain growth at elevated temperatures. Likewise it gives lead the capacity of work-hardening.

Corrosion Resistance

One of the outstanding qualities of tellurium lead is its improved resistance to hot sulphuric acid. In a flash test, specimens of tellurium lead, and lead without tellurium were held at 305°C. in 96% sulphuric acid for three minutes. (Illustration 1). Tellurium lead showed a weight loss of only 0.97%. The other lead showed a weight loss of 5.11%.

While the flash test results clearly indicate that tellurium lead is a good high temperature lead, actual service reports provide the best proof of its superior performance at the lower temperatures and acid concentrations encountered in most pickling and plating equipment.

For example, a metal fabricator in the eastern part of the country had been having considerable trouble with the lining and heating unit in a pickling tub containing a 12% sulphuric acid solution heated to a temperature of 180°F. In 1935, tellurium lead was used for replacement. After three years' operation, the engineer reported that no further trouble had been experienced and no repairs had been necessary.

In another plant, a tellurium lead heating coil was installed in a tank containing a bath of 10-20 per cent sulphuric acid which was maintained at a temperature of 170°F. The coil replaced an open jet steam system which oxidized badly at the acid level. Tellurium lead has not shown any signs of this action after four or five times the length of service of the lead previously used.

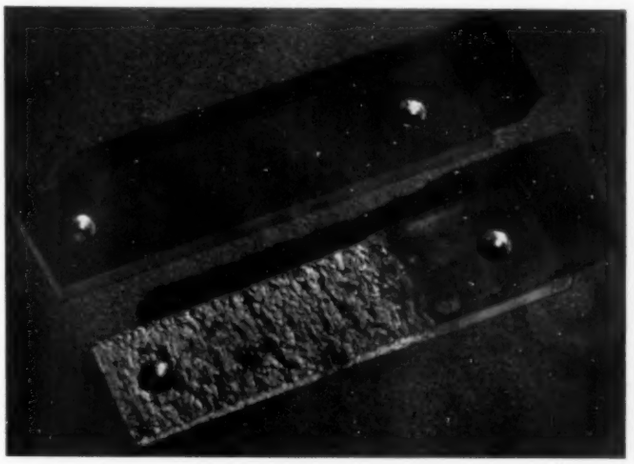


FIGURE I

Effect of hot sulphuric acid. The upper specimen is tellurium lead and the lower is lead without tellurium

Another service report from an ornamental metal concern in the midwest reads as follows: "We have two chromium plating tanks, one hot acid pickle tank, and two large nickel plating tanks that are lined with tellurium lead. We also use this type of lead for our heating coils. While all our equipment is performing satisfactorily, only our coils and acid pickle have been operating long enough to get a true comparison. The coils fabricated from tellurium lead in the chromium tanks last about 100 per cent longer than the coils which were previously used. The lining in our acid pickle is also standing up very well and is very satisfactory."

Still another report from an auto parts manufacturer has to do with tellurium lead anodes in a chrome solution containing two pounds of chromic acid per gallon of water at a temperature of 135°F. The user reported that tellurium lead was far superior to any other type of lead used for this purpose.

Some measure of tellurium lead's superior corrosion resistance can be traced without doubt to its finer, more uniform grain structure. Note that in the photomicrographs shown in Illustration II there is an absence of the roughness and coarse crystalline formations which characterize ordinary lead. As a result, tellurium lead has a smoother

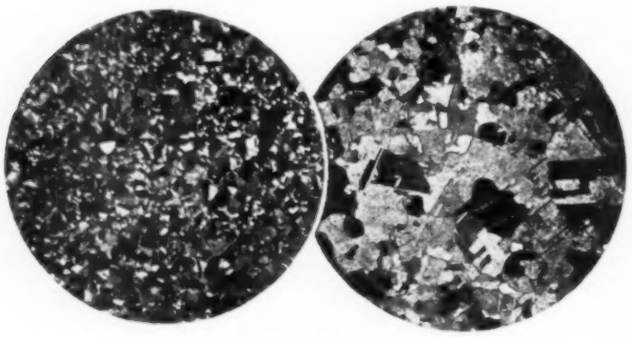


FIGURE II

Photomicrographs illustrating structures of tellurium lead (left) and chemical lead (right)

surface than most other types of lead. (Illustration III). There is a diminished possibility of pitting and local corrosion. In addition, most metal experts agree that fine and uniform grain size is an advantage from a corrosion-resistance standpoint, where conditions of mechanical stress, such as vibration or strain, are also encountered.

Probably another contributing factor, of special importance in high temperature operation, is the stability of this grain structure after prolonged exposure to heat. Freedom from grain growth is generally believed to keep down rapid corrosion at elevated temperatures.

In order to secure comparative data on this subject, a study was recently made of the rate of grain growth of chemical lead and tellurium lead, both in the rolled and extruded forms, when annealed at 150°C. (302°F.). This temperature was chosen as being the ordinary maximum in service for lead in chemical equipment. It is considerably higher than temperatures encountered in pickling and plating operations.

Specimens ¾" wide, ⅛" thick and 6" long were annealed in oil and the temperature was kept within 1 C. by means of an automatic control device. At designated times, the specimens were removed and ½" pieces were

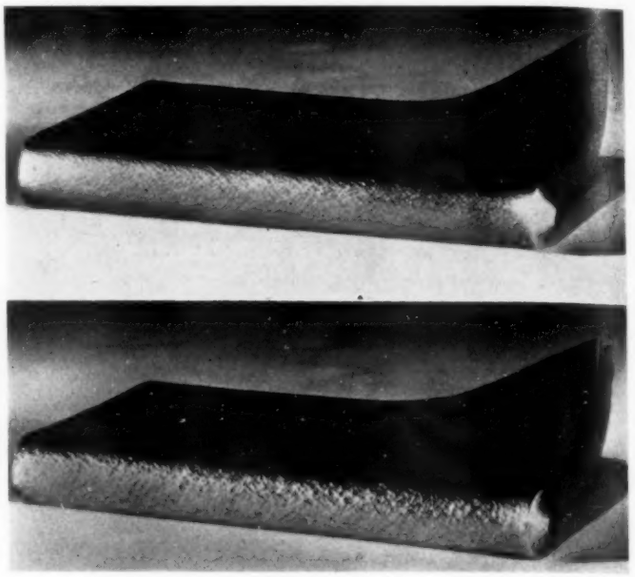


FIGURE III

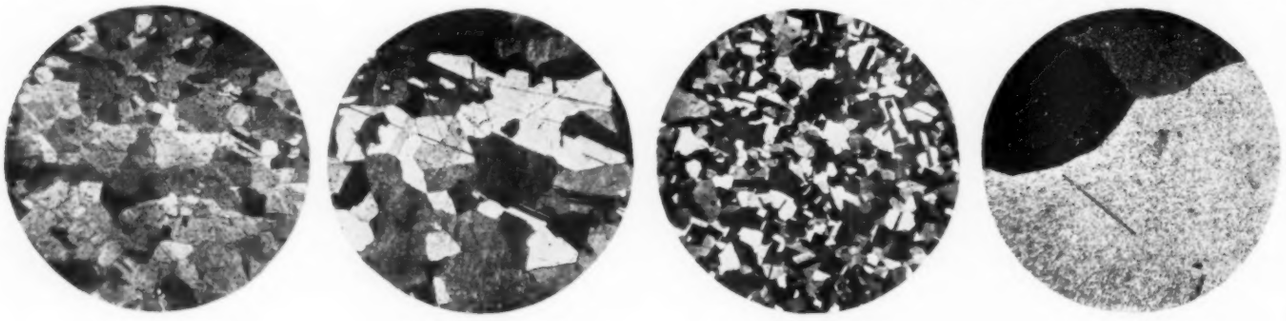
Upper, tellurium lead; lower, lead without tellurium

cut off the ends. These ends were polished, etched and photographed as shown on these pages. (Illustration IV). The grain size which was classified according to the A.S.T.M. procedure is recorded in the table that follows:

Size of Grain in Millimeters Diameter

Treatment of Specimens	*Rolled Chemical Lead*	*Sheet Tellurium Lead*	*Extruded Chemical Lead*	*Strips Tellurium Lead*
Untreated	.15	.065	.09	.045
32 Days at 150°C.	.12	.09	1.0+	.045
3 Months at 150°C.	.15	.12	1.0+	.045
6 Months at 150°C.	.20	.12	1.0+	.045

In the regular untreated samples, it was found that the average size of the grains of the chemical lead was twice as large as that of the tellurium lead. On annealing at 150°C., the rolled chemical lead showed practically no change for the first three months. Somewhere between three and six months, the grain growth started to take



Rolled tellurium sheet lead — *Rolled chemical sheet lead* — *Extruded tellurium lead* — *Extruded chemical lead*

FIGURE IV

place, increasing about 33% during this time. In the case of the tellurium lead, the grain growth started immediately on annealing, reaching an average of .12 mm. in three months. On further annealing for three months, no increase in grain size or grain growth took place.

In the case of the two leads in the extruded condition, there was a marked difference in their behavior with respect to grain growth on annealing. At the start, the chemical lead which had a grain size twice that of tellurium lead, showed a marked increase in grain growth with a size greater than 1.0 mm. in 32 days annealing. In comparison to this, the tellurium lead showed a small grain size of .045 mm. at the start which remained constant throughout the 6 months.

Work-Hardening Property

As noted above, one of the important new qualities which tellurium imparts to lead is the capacity to work-harden—a characteristic not found in pure lead or other lead alloys.

A piece of tellurium lead, work-hardened by rolling or stretching, actually has a greater tensile strength and resistance to fracture than a piece not so treated. This property was illustrated in the following way:

To toughen it, a piece of tellurium lead pipe was pulled out in a tensile testing machine to the point where an ordinary lead pipe would have fractured. The hydraulic pressure required to burst the tellurium lead pipe *after* pulling out, compared with that required to burst it *before* pulling out, was in the ratio 175:100. In other words, although the tellurium lead pipe had been considerably stretched and the wall thickness reduced, its resistance to hydraulic bursting was increased by 75%.

This ability to develop latent strength was also illustrated in a series of tests in which strips of tellurium lead and ordinary lead were placed in a tensile machine and over-strained 12½%. The strips were then tested at various periods up to six months. The results were as follows:

	Ordinary Lead	Tellurium Lead
Before Straining		
As received	2530 P. S. I.	2960 P. S. I.
After Straining		
3 min. after	2800 P. S. I.	3350 P. S. I.
1 hour after	2340 P. S. I.	3330 P. S. I.
7 days after	2240 P. S. I.	3400 P. S. I.
6 months after	2225 P. S. I.	3590 P. S. I.

The ordinary lead showed a temporary increase in strength three minutes after over-strain, but the strength then began to drop and was 12% less after six months. The tellurium lead showed a considerable increase in strength three minutes after over-strain. This increase continued and after six months reached a strength 21% greater than the original strength.

Another demonstration of the work-hardening property is shown in the photograph on this page (Illustration V). Strips of tellurium lead and lead without tellurium were stamped with their respective names and pulled out at equal rates of pull in a tensile testing machine. The lead containing tellurium was strengthened by the stamping. The other lead weakened and fractured where stamped.

Tellurium lead's capacity to strengthen itself when strained has been of special value in instances where the purpose or design of a particular piece of apparatus puts an undue burden on the physical strength of the corrosion-resistant material used.

For example, the engineer of a plating organization recently reported that he was using a tellurium lead heating coil for a chromium plating solution. The coil was connected to a 60 lb. pressure steam line and the temperature ranged from 110° to 115°F. The solution was used eight hours a day and five and one-half days a week. The coil required replacement every six months which the engineer considered excellent service since it was necessary to replace the previously used coils every two or three months.

In another case, an enameling concern, several types of lead coils were used in a pickling tank at steam pressures of around 20 lbs. There was continual trouble with blow-outs and pipe ballooning. As a test, tellurium lead coils were installed two years ago. So far no trouble has been experienced and no repairs have been necessary.

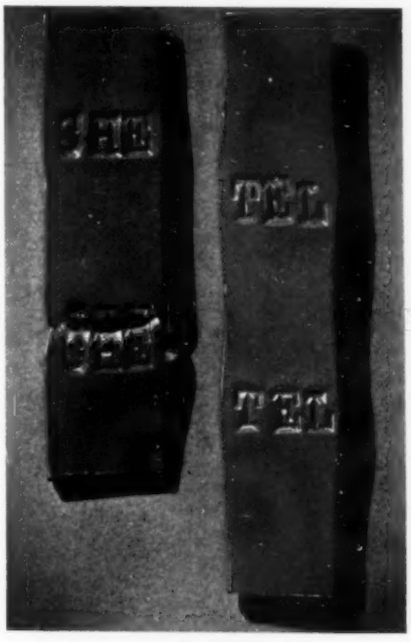


FIGURE V

In still another case, acid pickles are prepared in a tellurium lead-lined mixing tank. Strong sulphuric acid is dumped into the tank and sufficient water added to bring it to the proper strength naturally generating considerable heat. The operation has been repeated daily for nearly three years and to date no leakage or other difficulty has been experienced and the lining is as good as the day installed. The engineer reported that he believed tellurium lead was entirely responsible for this, as previously used linings had failed by cracking after relatively short intervals.

Fatigue Resistance

The service conditions described immediately above are admittedly more severe than those usually encountered in pickling and plating equipment. To the majority of chemical engineers in this field, the work-hardening characteristic of tellurium lead is important chiefly for its effect on the fatigue strength or vibration resistance of the metal.

Vibration plays an important part in the failure of lead, both from the corrosion resistant and mechanical strength standpoints.

Technically, a metal's resistance to vibration is known as its "endurance limit" i.e. the maximum load it will sustain under several million cycles of rapidly repeated stresses. The limit may be determined in any one of several types of "fatigue" testing machines.

Specimens of tellurium lead and leads without tellurium were tested in one such machine.

The results are given in the table below:

Endurance Tests On Haigh Machine

(Lbs. per square inch)

	Observer			Good Approximation
Material	A	B	C	
Pure commercial (99.9 lead)	403	..	403	400
Chemical (0.06 Cu.)	..	..	627	600
Tellurium (0.06 Te)	..	762	1120	1000

A = Beckinsale and Waterhouse.
B = Waterhouse.
C = Russell.

Evidence of the practical value of tellurium lead's improved vibration resistance is contained in the following report from a company operating a large pickler:

"We estimate approximately 25 per cent longer life from tellurium lead as compared to other leads. While general fatigue failure does occur, it proceeds to a greater extent before fatigue rupture is experienced. This is, in general, the source of improved performance."

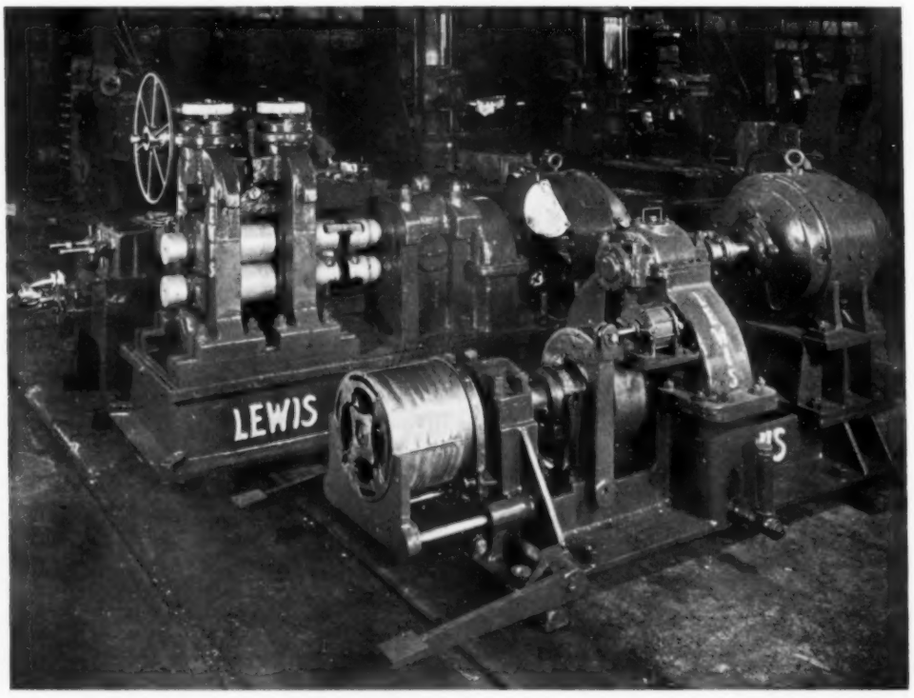
Another company refining metal by the electrolytic process, reports that tellurium lead is being used for tank linings, piping and other acid fittings because of its stiffness and resistance to vibration fatigue.

Summary

Laboratory tests as well as practical operating experience indicate that tellurium lead has an increased resistance to corrosion and mechanical failure, particularly under difficult service conditions. In addition, its finer grain structure and improved fatigue strength definitely increase its resistance to corrosion fatigue and related failures.

While tellurium lead is not intended as a substitute for other leads which have proved their value in actual service over a long period of time, its unique properties are of definite value in installations where the present equipment for one reason or another has proved unsatisfactory or troublesome.

NEW SKIN PASS MILL



Installation of a skin pass mill with an edging stand and a tension coiler has been completed at the plant of the Great Lakes Steel Corporation. The mill is an 8 inch diameter by 10 inch face two-high unit, to be used for skin passing cold slit strip in sizes from ½ to 6 inches wide and .012 to .125 thick.

The units are all roller bearing equipped throughout, and capable of rolling speeds of 400 to 1,200 R.P.M. A 40 H.P. motor, 400 to 1,600 R.P.M., supplies the motive power, driving through a flexible coupling to a combination gear drive and pinion stand and then through universal spindles to the mill rolls.

The unit is housed in cast steel, and the rolls are of forged alloy steel hardened to 90 scleroscope. The illustration shows the unit while still in the shop with the tension reel in the foreground.

Selection of Compounds for Automatic Buffing

By Dr. Walter R. Meyer

Editor, Metal Industry.

A theory of the action of compounds for buffing is presented as well as factors to be considered in the testing of buffing compounds.

Introduction

THE improvements in buffing compounds during the past ten years have been made possible by the increased accuracy and consistency of testing of these compounds on automatic machinery. Uniform application of wheel pressures, buffing compound, stroke and rotation of the work enable more equitable testing than when an operator is merely handed a piece of composition and told to test it. Utter disagreement between different opinions of hand buffers on the same compound has been experienced in hundreds of cases and there is little wonder at the disconcertion of buffing compound manufacturers who sometimes receive reports on buffing compound tests completely at variance with determinate performance. It is easy to be "penny wise and pound foolish" with buffing compounds as there are so many chances for hidden savings or losses which can greatly transcend differences in the price per pound so that an intrinsically better compound may be ultimately cheaper than lower priced materials. A corollary of the relation between buffing compound improvement and automatic buffing, is the development of buff construction and materials, which was also aided by the more nearly exact evaluation with automatic buffing than with hand buffing. Consideration will now be made of buffing compounds and principles of buffing in so far as they aid in the understanding of proper testing technique.

Theory of Polishing and Buffing

Polishing is an abrading or furrowing action in which the abrasive plows through the surface of the work accomplishing a leveling action by primarily scraping in contrast to the plastic flow and kneading action of buffing and coloring. It has been calculated that the surface atoms during buffing are imparted sufficient energy from the wheel to raise their thermal vibrations to their melting points thus enabling surface leveling, and in addition, crystal breakdown and slip complete the smoothing action. This mechanism for buffing was shown by numerous workers including Beilby (Beilby and most technical writers refer to buffing or smoothing as "polishing"). The sub-surface effects of polishing and buffing on the crystals of the metal being polished are shown in Figure I. Further indication of the plastic flow nature of buffing is given by the types of relatively soft abrasives used such as tripoli, lime and rouge in contrast to the harder abrasives such as silica (flint) and emery. Metals which undergo plastic flow readily such as copper and lead are difficult or impossible to buff so as to remove deep scratches without dragging, and hence must be abraded by, for example, sand bobbing illustrated in Figure II.

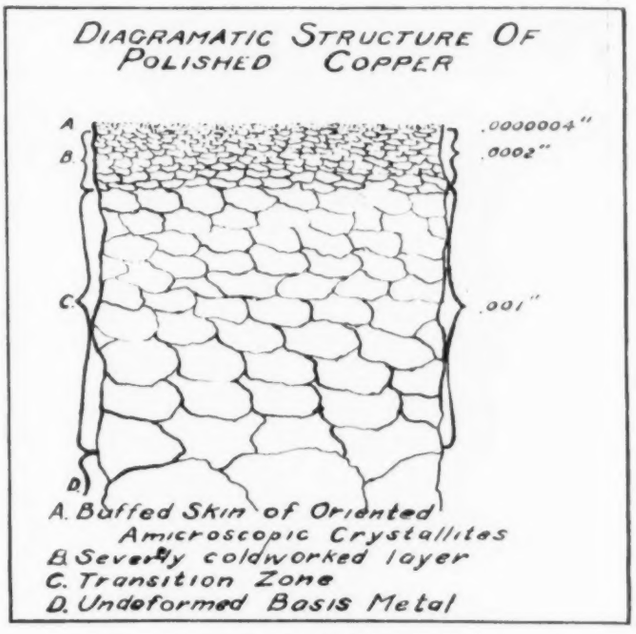


FIGURE I

Diagrammatic view of the crystal structure of polished and buffed copper

How do tripoli-grease compounds function in the mechanism of buffing? This question has never been fully answered but the following is the writer's concept of its modus operandi:

The functions of the buffing compounds are (1) to serve as a medium to transmit the pressure of the work against

the wheel or vice versa intimately to the minute elevations on the metal surface for accomplishing cold-working and flow, and (2) to lubricate the wheel-metal interface by retarding oxidation of the metal, overheating of the buffs and metal by excessive frictional heat, and to act as a medium for removal of the solid products of buffing similar to the way oil or water function in grinding so as to prevent clogging of the wheels. Function (1) would explain why structurally weak substances such as tripoli and lime

FIGURE II

Sand bobbing copper percolator bodies

are effective because of their readiness to undergo crushing to accommodate and equalize stress distribution. It also explains why very hard abrasives such as flint and emery are not as suitable for buffing even when of the same particle size as tripoli. The purpose of flint or silica in a buffing compound would be to effect a polishing action upon which is superimposed the normal buffing action of the tripoli.

Composition of Buffing Compounds

a. Binder.

The grease binders consist primarily of mixtures of tallow and stearic acid in which the melting points can be controlled by their ratio. Lanolin (wool grease), petrolatum, waxes, glycol derivatives and other materials are added to accomplish special results. Pre-saponification is also done with organic bases such as tri-ethanolamine with the intent of increasing ease of cleaning. The proper selection of the grease binder is vital to the life of the buffs and to the efficiency of buffing.

The optimum melting temperatures for the binders of buffing compounds vary with the type of metal, shape, etc. being buffed and in the case of a cylindrically shaped object, for example, such as coffee pots shown in Figure III, a compound with spreading action having a medium melting point would be desirable to free itself from the face of the buff to prevent glazing and at the same time by its melting point would have a spreading action on the surface of the work to be processed which would increase its efficiency.

However, in certain completely automatic cutting-down operations, particularly where automatic composition chucks are employed, it is not only desirable but necessary to have a compound with the higher melting point or harder type binder than is generally employed. This is due to the fact that where the manual touch is lost and is never fully duplicated by machine buffing, more frictional heat is normally generated. Therefore, a compound with too much spreading action or too low a melting point would prove ineffective and would be thrown from the surface of the work and the buff before properly accomplishing its purpose.

The proper lubrication of the buffing wheel is vital to prevent burning and desiccation or destructive distillation of the buffs with attendant oxidation of the metal being buffed. Improper lubrication can drastically reduce buffing wheel life!

b. Abrasive.

All-tripoli compounds are usually the best for general buffing but with certain jobs where a smearing action is encountered, the addition of silica may enable faster cutting to be obtained with a slight sacrifice in lustre. This is understandable in the light of the theory of buffing already mentioned and hence silica-tripoli buffing compounds are being used for fast cutting when high lustre is not important. The possible grease content of silica-bearing buffing compounds is reduced by the lower absorption ability of silica as compared to tripoli and due to the lower surface area of silica for equal weights of abrasives.

Several consultants acknowledge a slightly lower buff life from silica-bearing buffing compounds but this may be offset by lower labor costs due to faster cutting action on specific classes of work.

c. Type of Buff.

This subject is somewhat controversial but all agree that sheetings with high thread-count (in the 80's) are to be preferred. Diagonally cut cloth construction, and ventilation are obviously of more importance in automatic buffing than hand buffing.

d. Cleaning after buffing.

Complete emulsifiability of the unused compound is no absolute criterion for ease of cleaning as the high temperatures involved cause dehydration, volatilization and oxidation of the compound while it is undergoing dilution with solid metal thus resulting in a mixture containing only from 20% to 30% grease instead of 31% to 35% as in the original cake.

Cleaning is usually most effective with freshly buffed work, becoming more difficult after aging, and hence comparisons of cleaning ability should be made with the same time interval after buffing. Saponification during cleaning takes place readily with the stearic and oleic acids in the

binder, but tallows and fats are only slowly saponified under the usual cleaning conditions and hence saponifiability is a questionable factor in removing tallows. Cheap mineral waxes are contributory to poor cleaning as they adhere tenaciously to the buffed surface, cannot be saponified and are only dispersed or emulsified with difficulty.

CHECK and COMPARE ACCURATELY!
when testing samples of
Buffing or Polishing Compounds

Operation..... Wheel Speed.....

Material..... Diameter.....

GRADE	PRESENT	E.R.B.
Price per lb.		
Weight of bar at start		
Weight of bar at finish		
Weight of Material used		
1) ***Cost of Material used***		
Weight of Buffs at start		
Weight of Buffs at finish		
Weight of Buffs used		
2) ***Cost of Buffs used***		
Time at Finish of Test		
Time at Start of Test		
Rate per hour		
3) ***Cost of Time taken***		
4) ***Number of Units Finished***		
Net Cost of Operation		

These are the four factors that determine the "net" direct cost of any buffing or polishing operation.

It is not always possible to use the same grade on similar jobs, because wheel speeds play a very important part in the performance of a buffing compound

When requesting samples, always specify (1) Material worked, (2) Diameter and spindle speed of wheel.

FIGURE III

Sample of a grading card for testing buffing compounds

(Courtesy of E. Reed Burns Co.)

Difficulty in cleaning even high grade compounds is understandable when we consider that from 70% to 80% of the buffing "dirt" is inert solid. Emulsifiable solvents have been effective in cleaning of buffed parts because they can dissolve the binders and at the same time disperse the solids.

Equitable tests of buffing compounds should include a summation of the following costs based on significant quantities of work buffed.

1. Cost of compound per unit of buffed work. (not per lb. of compound).
2. Cost of buffing wheel per unit of work.
3. Labor and overhead per unit of work.
4. Added or lowered cleaning costs.

Judgment of the above, of course, cannot be made unless the proper finish is obtained.

Mention should be made here that tests should be run on properly aged compounds because in some cases, buffing efficiencies of compounds may be as much as 20% lower when freshly made than after seasoning. This change or aging of tripoli is associated, at least in part, with a recrystallization of the stearic acid which proceeds rapidly the first 48 hours and then continues slowly over a period of weeks to completion.

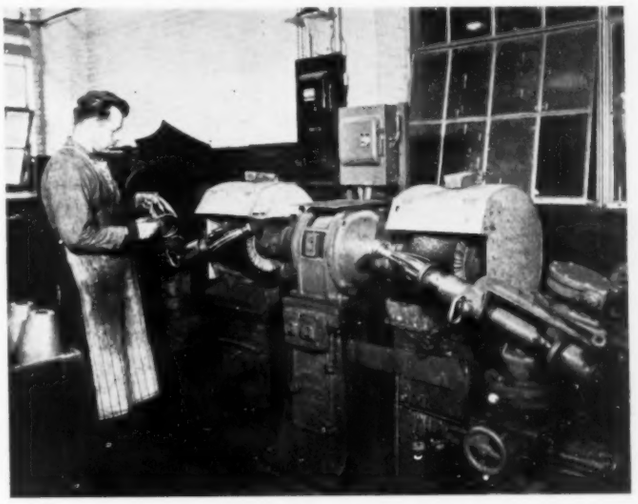


FIGURE IV

Semi-automatic buffing of percolator bodies

The suggestions for testing which have been enumerated obviously can only be used in entirety when there are large quantities of the same products available for buffing, but in cases where complete tests have been possible, the savings resulting from careful studies have been surprising. Regard a piece of buffing compound as a tool, which must be chosen to fill specific requirements for definite applications because the seeking of general duty compounds will lead inevitably to waste.

Acknowledgment is hereby gratefully made of the assistance of buffing compound and equipment manufacturers in the preparation of this paper. Extra recognition is given to *Lloyd Burns* of E. Reed Burns Manufacturing Company, *Louis Hague* of Hanson-Van Winkle-Munning Company, *Ralph Eastman* of Frederic B. Stevens, Inc., *M. F. Hennessey* and *Gene Phillips* of Puritan Manufacturing Company, *R. C. Harrison*, of Harrison & Co., *F. A. Weihe* of McAleer Manufacturing Company and *A. P. Munning* of Munning & Munning, Inc., who discussed in detail the subject matter herewith presented.

Goldsmiths' Guilds of London

By

Joseph Danforth Little

International Silver Co., N. Y.

The author presents an delightful historic account of the tradesmen's guilds of Europe which had such an important part in the economic, social, and religious development of the world during their period of glory. Joseph Danforth Little is an intense student of the historical aspects of silver and gold craftsmanship having published numerous papers on allied subjects. His message on pride of workmanship and his picturesque portrayal of the religious and philanthropic aspects of guild society are particularly appropriate for the Spirit of the Season. . . . Editor.

Introduction

GUILDS have played a very important part in the history of our civilization. During the Middle Ages there flourished, for every important trade, numerous companies of craftsmen known as "Guilds." One of the most famous of these guilds was "The Guild of Goldsmiths." To these old guild craftsmen, goldsmithing and silversmithing were almost a religion. Honest craftsmanship and perfection,—were the ideals for which they constantly strove and many were the activities of the ancient trade guilds. They endeavored to maintain the high standards of excellence of workmanship and to appoint inspectors to see that no false or inferior work was turned out. They also regulated the number of apprentices, and settled disputes between masters and workmen. Until the twelfth century, workers in precious metals were engaged almost exclusively in the production of articles for the church, but before the opening of the thirteenth century this ceased to be the case. This branch of art craftsmanship was no longer practiced by the monks alone and the trade guilds came into existence.

Historical Development

The first charter of the goldsmiths was granted in 1327. It also authorized and confirmed the practice of marking gold and silver, although this must have been a function of the guild long before. They reported that "the cutlers deceitfully covered tin with silver so subtly and with such slight, that the same can not be discerned and severed from the tin and by these means, they sell the tin so covered, for fine silver." The charter gave power to the company to punish offenders and make it compulsory to have all gold and silver marked by the company. The guilds have carried on their useful work for over 600 years, to the present day without a break, and the service rendered is incalculable. The company has always given annuities to the infirmed, and the benevolent work of the Goldsmiths' Company has continued to this day, with increasing volume. Its charities have been and are enormous. These old guilds in England must have covered nearly the whole male population for there were Guilds of Knights, Guilds of Merchants, Guilds of Parish Clerks, and guilds of an enormous number of trades, minutely sub-divided, such as the leather pressers, the saddlers, the furriers and many others. In the reign of Richard II, there were over 40,000 guilds in the provinces and in London. Unfortunately, the great fire of London in 1666 destroyed the archives which contained many of the records of the old guilds of England.

The earliest trade guilds were voluntary associations of members of the same trade, both masters and workman, to protect one another from injury and to assist and relieve members who were in poverty and distress. They were pervaded by a true spirit of brotherhood. Each member on joining, paid an entrance fee and took an oath of fidelity and obedience to the ordinances of the guild. Meetings were held four times a year, in the early days of the guild, at the houses of different members in rotation and when they became rich enough to

Goldsmiths' Hall in London

obtain it, the meetings were held in their own guild halls. One of the great ambitions of the guilds was to possess a hall as a meeting place of their own. The goldsmiths appear to have been the first to do so, for they purchased a site in 1357 and in 1364 held their first meeting in the new hall. Up to the fourteenth century, the only two crafts known to have possessed halls of their own, are the Goldsmiths and the Tailors. The Goldsmiths Hall and all its furnishings were destroyed in the fire of London in 1666.

Ethics and Functions of Guilds

It was considered an honor and a privilege to be a member of the guild and apprentices looked forward to

the day when they would receive their indentures and be admitted to the "Arts and Mysteries of the Trade." If one studies the chapters of the old trade guilds, one is impressed with two interesting points. First, they considered of prime importance the duty of assistance to the sick and poor members of the guild, and secondly on proper and honest workmanship of good material.

Today, the economic purposes of the companies or guilds have almost completely disappeared, although some curious and picturesque relics of the original objective of their existence survive. They are, for the most part, benevolent organizations often of very large endowments, the income of which is used for charitable and philanthropic purposes. At one time, the masques or pageants were a great feature of the guilds.

The spirit of the guild was handed down from father to son through many generations. The masters of the guild dedicated their lives to their work and passed down their work, a priceless heritage, to their sons and grandsons. Many of the old guild pieces were conceived in reverence. So devout and so filled with love of their art were the worthy masters of the ancient guilds of silversmiths, that they were wont at the opening of each meeting, to seek inspiration in prayer to God "that He might further the interests of these people and their craft." To these old time craftsmen who thus sought in prayer to consecrate their daily toil, the ideals and traditions of the guild were of paramount importance. Rigidly, they guarded the secrets of the craft from lesser artisans who sought to copy.

The guilds were originally semi-religious, semi-commercial organizations designed to promote trade, to look after the welfare of fellow tradesmen, to train the younger generation in "the mysteries of their craft and to render to the glory of God." Gradually the requirements that a man must belong to the company associated with that trade, was abrogated, for the son of,—say a skinner—was a skinner by right of inheritance, even though he might be a member of some other trade or profession. From time immemorial, the usual method of obtaining admission was by serving an apprenticeship for seven years, but for the last hundred years this apprenticeship has been merely nominal. The rules of all guilds were such as to inculcate respect for the law, a higher standard of commercial honesty, together with kindness and consideration for the members and the poor.

Pride of Craftsmanship

Weeks and months the old guild masters labored to produce a single piece of silver! Such was the love for the article they created that, no effort was too great, no period of toil too long, to make them perfect. They worked for the pure joy of creating. Day after day, often far into the night they were carried along by that exaltation which comes to men in any age, only with the knowledge that they are doing the best of which they were capable. This was the spirit of the sixteenth and seventeenth century guilds, the spirit which made every piece of silver or gold a masterpiece.

The old guild silversmiths did not lightly esteem their art. Musty records of a bygone age tells us that their devotion to their craft amounted almost to a religion. Patiently they hammered and annealed the dull sheet of silver, which eventually was to become a masterpiece and with a love that was akin to devotion, they adjusted and soldered each border or handle and reluctantly they parted with the completed masterpiece.

Under the old craft guilds, there was nothing resembling the present system of competition. The craftsman asked and received a good price for his work, made of sound material which would consequently last a very long time. He did not try to dodge his neighbor and undersell him. The question of cheapness was not considered. The old goldsmiths and silversmiths were indeed craftsmen and cunning workers, as rare pieces of early make, still extant, show. They were more idealistic concerning their craft and less militaristic than might be said of union members of today. One sometimes asks what was the reason for the stability and loyalty of the old guilds. The answer seems to be contained in one word "brotherhood." The spirit of the guild was brotherhood and that gave enduring qualities. Would that we could have more of that spirit in this day of unrest and competition. Not until the workmen of today in factory and workshop, can recapture real interest and imagination in their work, can we expect the same fine results from them.

The greatest boon towards which we can look forward from the shortening of the working day, is the fact that people will have leisure to learn to make things in which they will take pleasure. Investigation seems to show that the American mechanic's pride in accomplishment which distinguished the workman of past generations, has been submerged by the modern craze for speed, quicker profits and ostentation. It is to be regretted that we can not have a revival of the craftsmanship spirit. According to far-seeing captains of industry, this would bring about a great industrial and social revival. It would necessarily result in the production of superior work, develop respect for the craftsmanship of others and establish greater contentment, based on the assurance that, with wider appreciation of craftsmanship, employment would be all the more continuous and secure for those of ability. As for social results, the revival of the craftsmanship spirit would stimulate creative instincts and the desire for self expression. It would raise the crafts in their own estimation as well as that of the public and would restore the social position of the workers to give the true craftsman an honored standing in the community.

PLATING AND FINISHING
FABRICATION — ASSEMBLING
METALLURGICAL — ROLLING
CASTING AND JOINING

SHOP PROBLEMS

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H. M. ST. JOHN
Supt. Brass Foundry,
The Crane Company,
Chicago, Ill.

When sending solutions for analysis please give following information: name and address; class of work being plated; kind of solution and volume; length, width and depth of tank; temperature of solution; current density, cleaning sequence and any other pertinent facts.

Full information is necessary in order to render proper service.

Retinning Milk Cans

Q. Will you please send us information regarding retinning and soldering of old milk cans as well as testing of the finished cans.

A. It is necessary to hammer out all dents and have the can body in perfect condition before it is given the tin coat. Wooden mallets, special rolls and special tools are used for removing these bends and dents.

In the retinning plants where production is large, the old cans are soaked in a metal soaking pot and the old bottoms dissolved loose, the solder going into this rough metal pot. These old cans to be retinned are then put through a cleaning solution and pass through the regular steps that the new dairy cans pass through. All the cans are hot-dip tinned with the bottoms removed. A full production schedule may be from 800 to 1200 cans a day.

No matter what size of plant, if a high quality retinning job is expected, the old cans must be taken apart. This is because of greases from the contents of the cans getting down into seams and openings.

Soldering is done in the usual manner with a small soldering iron and heating furnace for the iron. The usual soldering flux is used and when the bottoms are in, they are then passed over to the testing department, next to the soldering benches.

The testing department consists of 7 compartments made of steel. Each compartment is 15″ wide by 20″ long by 30″ deep. A one-half inch steam line heats the water. The cans that pass inspection are given a beautiful bright finish by polishing with gasoline and whiting. They are finally wiped with a very soft rag until perfectly clear and bright and then packed or wrapped in heavy brown wrapping paper to protect the finish.

—WALLACE IMHOFF

Oxidizing Sterling Silver

Q. We have been having trouble finding a satisfactory stop-off for placing Sterling silver pieces in a cold gilding solution. Do you know of anything that would help us in this question? We would also appreciate knowing what various materials are used for oxidizing Sterling silver.

A. The most satisfactory stop-off for plating on Sterling from the viewpoint of resisting cleaners, dips and cyanide solutions, is black asphalt, dissolved to the desired consistency in a suitable solvent such as turpentine. A similar stop-off is available on the market. For improved adherence of the stop-off, a mixture of spar varnish and the above is also used, one good ratio being 5 parts by volume varnish to 1 part asphalt (thinned to about the same consistency as the varnish). Such stop-offs should be baked about 250°-300° F. after application, for at least 4 hours, after which they will withstand, without peeling, brief immersion and cleaning in alkaline solutions (with or without mild currents). They may be removed by washing in hot turpentine or in acetic ether (ethyl acetate).

For oxidizing Sterling, acid solutions of either tellurium, selenium or platinum are used. Sulphur oxidizers (such as sodium sulphide or polysulphide) are not generally employed. Of these oxidizers, the platinum is best, giving shades from deep black to soft gray as desired and being most permanent, resisting to a marked degree even continued immersion in cyanide solutions. The latter property is not held any too well by the selenium and tellurium, nor are the blacks which are obtained in the latter two cases as "pure," tending somewhat to the brownish hue. However, for the deeper tones,

Oxidizing Sterling Silver

(Cont'd)

the platinum solutions become expensive, and only when grays are satisfactory does the cost approach that of tellurium and selenium. Of all three, probably tellurium is favored for general purposes.

The following formulae are illustrative of good oxidizing solutions, although the practice varies widely.

1. Tellurium oxide 2 ozs.
   Concentrated hydrochloric acid 1 qt.
   Water to make 1 gal.

The tellurium is dissolved by continued heating with about half the acid. After cooling, the remaining acid and water are added.

2. Two ozs. of selenium metal are dissolved by heating in 1 to 2 pints of concentrated hydrochloric acid, to which small additions (about an ounce each) of nitric acid are cautiously made to accelerate the reaction. When dissolution is complete and no more red-brown fumes are liberated, the solution is cooled and 8 ozs. of copper sulphate, previously dissolved in a quart of water, are added. The whole is then diluted with water to 1 gal.

Both of the above-mentioned solutions should be used at temperatures of 150° to 175° F. The work should be clean and hot before immersion into the solution. After a few seconds immersion, the work should be thoroughly rinsed in water and preferably also in a neutralizing solution (for example, of soda ash), after which it is ready for relieving.

3. The platinum oxidize may be made by dissolving 1 dwt. of platinum metal in about an ounce of aqua regia. This requires continued heating for about a day, for example on a sand bath about 150° to 175° F. The resulting solution may then be diluted as desired. The more concentrated solutions give the deepest blacks and in the shortest times, but usually appreciable dilution is necessary to reduce the cost. For example, the above may be diluted to 1 gallon, the resulting color being gray and only obtained very slowly. Its action and appearance may be improved appreciably, and to a satisfactory state, by adding to it about 4 ozs. of ferric chloride—Silver Technologist.

Flaky Hot Galvanizing

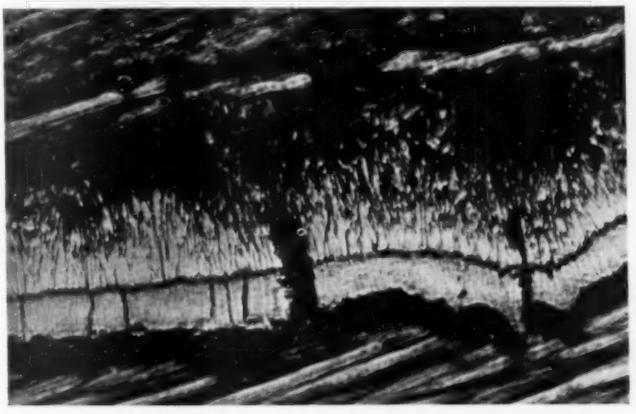
Q. Will you please examine the sample of hot galvanized conduit which has been sent you under separate cover, as flaking of the coating occurs even on relatively small bending of the pipe.

A. Microscopic examination of a cross-section of the conduit showed that the difficulty was due entirely to too long immersion in the molten zinc. You will note that the coating is flaking in blocks as is illustrated in the photomicrograph, and that the separation from the iron base is in the Fe_3Zn_{10} zone. This zone is far heavier than it should be for coatings to withstand bending without flaking, being approximately .001" in thickness. The marked propensity towards flaking when the Fe_3Zn_{10} is heavy is due to the fact that this zone is brittle and stiff, therefore, not being able to crack to properly relieve the stresses during bending, and hence flakes in blocklets.

I would estimate that the conduit was immersed in the molten zinc for at least 10 minutes which is at least double the maximum allowable time, or it may possibly have resulted from the temperature of the zinc being higher than the proper temperature of 860° to 870° F.

You will note that the wiping treatment has almost completely removed the free zinc, leaving a deposit which consists of the relatively greater brittle $FeZn_7$ and Fe_3Zn_{10} zones. Coatings of this type have been observed in cases where the conduit has been re-galvanized due to bare spots resulting from improper pickling of the steel previous to the first dip in the galvanizing bath.

—W. R. Meyer



Photomicrograph of hot galvanized coating. Note the flaking in blocklets. Mag. 250x

Nickel Pitting

Q. We recently added 1½ pints of 100 volume hydrogen peroxide to a 500-gallon nickel solution. After standing overnight the solution gave rough deposits which peeled very badly. The other nickel solution to which no peroxide was added, gave satisfactory deposits with the same cleaning procedure. Will you please let me know what the trouble is and what action takes place when hydrogen peroxide is added?

A. Old nickel solutions that have never been treated with peroxide should be treated cautiously with that chemical. Although the amount you added would not be considered excessive for solutions that have been so treated regularly, yet in your case it apparently was excessive. Lacking a full history of the solution it is not possible to make a specific reply in explanation of your trouble with peeling and rough deposits. However, the following remarks are offered for consideration and can be applied as may seem fit in your case.

The action of peroxide in preventing pitting is not thoroughly understood. It probably acts partially as a "depolarizing" agent. That is, it combines with the hydrogen bubbles released on the work, forming water, and thus removing the bubble, which is figured in this explanation as causing the pit. Or, the peroxide may pre-

vent the bubble from forming in the first place.

The presence of iron in a nickel solution has been said to cause pitting. The explanation is that iron is precipitated in the film next to the cathode due to the fact that the film of solution next to the cathode is highly alkaline. Iron hydroxide is precipitated, and the particles of precipitate either adhere to the work or form nuclei at which hydrogen bubbles form and which insulate that particular spot of the work from the solution, preventing the deposition of nickel and resulting in a pit. When peroxide is added to a solution, the iron is oxidized to the ferric condition and in this form is precipitated and goes to the bottom of the tank. Thus the iron is out of solution and will not be available for the precipitation action at the cathode as described above. If much iron is present, the addition of peroxide will also cause the solution to become acid. Therefore, after adding peroxide, check the pH of the solution and correct if necessary.

In your case you may have tin in the solution due to the plating of tin plate. Peroxide will also cause precipitation of tin. While iron hydroxide is not often the cause of roughness it is probable in your case, that tin hydroxide was precipitated and that this caused rough deposits. Tin may also be precipitated in the form of meta stannic acid, which is a gelatinous material and will float around in the solution.

The peeling referred to may be due to tin precipitation as described or it may be due to an excess of peroxide although the latter explanation hardly appears plausible with an addition of only 1½ pints of peroxide to 500 gallons. Nevertheless, an excess of peroxide will cause peeling especially on steel when the current density used is low. During the period when the steel is receiving the first deposit of nickel, the peroxide has sufficient time to act on the steel and oxidize the surface. This can be noted by removing the work after say 2 or 3 minutes and it will be seen to be discolored, instead of having a white nickel color. If your solution has a large amount of mud at the bottom of the tank due to precipitation action of the peroxide, it is advisable to filter or decant the clear solution. A tin precipitate is very hard to filter and if tests show this to be present it is advised that you make use of so-called "filter aids."—G. B. H., Jr.

Faulty Nickel Solution

Q. Will you please analyze the nickel solution sent you as it has poor conductivity and also pits. I have been using ammonium chloride almost exclusively to attempt to raise the amperage without resorting to an increase in voltage. Pitting has occurred with pHs from 5.7 to 6 and increasing the current density makes the pitting exceptionally prominent. Do you consider test sets for colorimetric determination of nickel and pH to be in good condition after 12 years?

A. The analysis of your solution shows the following: nickel 2.37 ozs./gal.; ammonium chloride 4.02; pH 5.8.

When the sample was received there were several crystals of nickel salts at the bottom of the bottle. This indicates that the solution is at the point of super-saturation due to the high ammonium content, resulting in crystallization of double nickel salts. Double nickel salts have a low solubility. This condition will cause the anodes to polarize and thus set up a resistance which will cut down the flow of current.

Inasmuch as you have what in effect is a double nickel salt solution, you will have to run at a lower metal content. A better value for nickel would be about 1.8 ozs./gal. To obtain this, remove ¼ of the solution and add water. If possible, syphon off the top ¾ of the solution and discard the bottom quarter containing the mud. Return the clear solution and make up with water. An addition of ½ oz./gal. of boric acid can then be made.

Pitting can be corrected by the use of hydrogen peroxide or a suitable wetting agent. In the case of peroxide, add 1 pint of 100 vol. peroxide to each 100 gallons of solution. Small additions are necessary at intervals when pitting starts to show up again.

With these corrections, you should be able to obtain the desired current density. Faster plating may be obtained with a straight single salt solution. If a white frosty deposit is desired, however, the double salt solution is preferable. Maintain ammonium chloride at 2.5 ozs./gal. and nickel at 1.5 to 1.8 ozs./gal. for a double salt solution.

If the test sets are 12 years old, they should be returned to the manufacturers for checking.—G. B. H., Jr.

Faulty Zinc Solution

Q. Will you please analyze the acid zinc plating solution sample forwarded to you.

A. The analysis of your zinc solution is as follows:

Metallic zinc	11.1 oz./gal.
Zinc sulphate	48.4 oz./gal.
pH	4.8

The metal content is satisfactory but the pH is too high. This solution requires the addition of 27 fluid ozs. of sulphuric acid to each 100 gallons of plating solution.

Zinc solutions have aluminum sulphate added to control the pH. If a precipitate of voluminous proportions forms, it indicates that the aluminum is precipitating and that the pH is too high. Enough acid should be added to bring the pH down to 4.0 using bromphenol blue indicator.

The grape sugar and ammonium chloride do not have any appreciable effect on the plating and are not considered of sufficient importance to require analysis. The pH is the most important factor and should be controlled fairly closely.—G. B. H., Jr.

Bright Etching Aluminum

Q. How can aluminum be bright etched?

A. Sheet aluminum is usually etched in warm alkaline solutions such as 2 oz./gal. of caustic soda or 6 oz./gal. of tri-sodium phosphate, heated to 180° F. Etching is usually accomplished in from 5-15 seconds. Deep etching or overetching may leave a smut of elements, such as copper, not soluble in alkali, and this smut may be removed by dipping into strong nitric acid (greater than 60%). Strong nitric acid is preferable to dilute acid as the aluminum is passive in the strong acid while it is attacked in dilute acid. Cast aluminum having high silicon, copper and iron contents, is etched in nitric acid-hydrofluoric acid solutions.—W. R. Meyer.

METALLURGICAL DIGEST

SELECTED ABSTRACTS ON CASTING—ROLLING—PHYSICAL METALLURGY

Age-Hardening of Duralumin, by Morris Cohen. Metals Technology. October, 1938.

The basic aging mechanism of duralumin involves a pre-precipitation stage as well as actual precipitation. It is believed that the pre-precipitation stage is a process of nucleus formation in preparation for the precipitation of $CuAl_2$. However, when the precipitation occurs, it does not take place uniformly. Localized precipitation sets in first along the grain boundaries, and this is ultimately followed by general precipitation within the grains. The pre-precipitation stage is indicated by a slight contraction and a considerable increase in electrical resistance, but no change in microstructure or lattice parameter. The localized precipitation stage is characterized by a slight expansion, a modest decrease in resistance and a darkening of the grain boundaries, but still no change in lattice parameter. The general precipitation stage is accompanied by a large expansion, a rapid decrease in resistance, a darkening of the whole microstructure and a change in lattice parameter. These three stages may overlap to a considerable degree, but they proceed at different rates and are sufficiently distinct in duralumin to result in three-step hardening. During the room temperature aging of duralumin, the hardening is essentially due to nucleus formation. Any actual precipitation that may occur at room temperature is incidental and not a vital factor in the hardening mechanism.

It is further suggested that this combination of nucleus formation, localized precipitation and general precipitation offers a comprehensive picture of the age-hardening process. Many modifications of this three-stage process are possible. For example, an aging system that undergoes uniform precipitation represents a special (and perhaps very rare) case in which there is no localized precipitation. Such an alloy would exhibit a two-stage hardening process, owing to nucleus formation and general precipitation. On the other hand, if the alloy is highly susceptible to plastic deformation during quenching, the localized precipitation stage may be emphasized because of the accelerated precipitation along the slip or twinning planes as well as at the grain boundaries. It is also conceivable that, in some alloys, localized precipitation may set in so rapidly that it obscures the evidence of the pre-precipitation stage in regions where general precipitation will eventually occur. This should result in two-stage hardening due to localized and then general precipitation although both precipitates are actually preceded by nucleus formation. Finally, if the precipitation is very non-uniform, the effects of the individual stages may overlap to such an extent that only a single hardness peak is found. One may visualize many additional variations and combinations of these processes.

Thus the occurrence of one, two or three hardening stages in the aging curves of alloy systems may all be explained on the basis of the general mechanism herein presented for the age-hardening of duralumin.

Oxidation-Resistance in Copper Alloys, by L. E. Price, and G. J. Thomas. Transactions Journal of the Institute of Metals, Vol. LXIII, 1938.

It is shown, from theoretical considerations, that an alloying constituent added to prevent high-temperature oxidation should have a sufficient affinity for oxygen, and should on heating, form an oxide film of high electrical resistance. If possible, the radii of the cations in the protective oxide should be small, and the oxide must not be one which is deficient in cations. These principles provided an explanation of the good resistance to oxidation conferred on copper by additions of beryllium and aluminum, and suggested a method by which it could be increased.

By pre-treatment of aluminum-copper alloys in suitable atmospheres, continuous films of pure alumina were formed on the surface which resulted in increased resistance to oxidation.

Nickel Silver: A Survey of Published Information. By T. F. Pearson. Research Report R. R. A. 472 of the British Non-Ferrous Metals Research Association, Regnart Bldgs., Euston St., London, N. W. 1, England. Size 9¾ x 6, 36 pages. Price 3s, post free.

As a preliminary to certain researches which the British Non-Ferrous Metals Research Association has in hand, the author made a careful examination of available information on nickel silver alloys. The results of his survey are set out in the present publication.

After a short introductory section, the specifications for nickel silver alloys issued in various countries are listed and discussed. Then follows a section devoted to the mechanical and physical properties of the alloys. Values for the mechanical properties in both cast and wrought forms and at various temperatures are noted, together with the endurance properties. Data on physical properties include thermal conductivity and electrical resistance, density, tarnish resistance, shrinkage and fluidity etc. The various aspects of melting and casting are next dealt with. Some casting defects are mentioned, and there is a short account of sands and sand moulding. The effects of impurities on behaviour in casting and working and on properties then receive attention, the impurities considered including lead, tin, manganese, aluminum, iron, silicon, carbon, phosphorous, magnesium, sulphur, oxygen, antimony and arsenic. Finally there are accounts of the working of the alloys (rolling, extrusion, jointing, cleaning and finishing) and of the effect of annealing. A selected bibliography of nearly 90 items is provided, reference to which is made throughout the text.

Adherence of Electrodeposited Zinc to Aluminum Cathodes, by H. R. Hanley and Charles Y. Clayton. Metals Technology, October, 1938.

The authors studied factors which influence the adhesion of electrodeposited zinc to aluminum cathodes. In contrast to electroplating, good adhesion is not desired inasmuch as the zinc must be stripped from the aluminum cathodes.

Although some impurities in the solution, which are plated with the zinc, may increase the stripping load for the removal of deposits, this feature is not regarded as pertinent to the subject of adherence because the purification system will prevent the presence of these toxic substances.

Impurities in solution that promote resolution of the deposited zinc in the acid electrolyte, as well as abnormal etching of the aluminum cathode, may be the starting point of adverse roughening of the aluminum plate. This roughened surface becomes more etched and hastens the time when the zinc deposit starts to adhere more tightly. The exposure of an old (and usually roughened) aluminum plate to the attack of acid, aided by the absence of zinc, definitely etches it. The partial cathodic zinc protection of the aluminum plate is not sufficient to prevent the development of the adverse surface. The aluminum plates that are hardest develop adverse surfaces at a slower rate.

Mild etching of smooth aluminum plates does not produce great adherence of deposits. Steel brushing or scratching alone produces a similar effect. Etching of a steel-brushed plate, or etching of a roughened plate caused by prolonged use as a cathode, develops a surface to which zinc deposits will tightly adhere.

ELECTROPLATING DIGEST

SELECTED ABSTRACTS ON PLATING—FINISHING—RUST PROOFING—LACQUERING

Chromium Plating, Particularly Black Chromium Deposits. By Kurt Arndt and Heinz Endrass. Z. Metallkunde 30, 21-4 (1938). The authors investigated the best conditions for depositing black chromium and found that an electrolyte containing between 250 and 400 grams per litre of chromic acid with 5 cc per litre of glacial acetic acid, was the most suitable for depositing black chromium. The temperature should be kept below 75° F. and a current density between 750 and 1000 amperes per sq. ft. is necessary. The black deposits contain about 75% metal and 25% oxides of chromium.

The Nickel and Chromium Plating of Tinplate, by A. W. Hothersall and C. J. Leadbeater. Transactions Electrodepositors' Technical Society, April 27, 1938.

Tinplate, as a base for chromium plated sheet required for fabrication, offers the advantage over steel of being easily polished, but difficulties have arisen, especially with coke grades of tinplate, in obtaining nickel deposits sufficientlly adherent to withstand chromium plating and fabrication without flaking.

These difficulties are attributed to two effects: (1) mechanical effect during straining of variations in thickness of the tin coating. (2) the effects of hydrogen produced during plating, particularly the disruptive effect produced by the conversion of atomic hydrogen (diffusing through the nickel) into gas at the site of discontinuities (foreign particles, fissures, etc.) at the interface—nickel/tin.

The diffusion of hydrogen into the tin surface can be prevented by depositing a film of copper before nickel plating. Tinplate which has been coated with a composite deposit of copper, nickel and chromium can be fabricated without flaking of the deposit. If the deposit is brittle, however, it is liable to crack on deformation, giving an unsightly appearance. Certain nickel deposits may be seriously embrittled by chromium plating.

The porosity of composite deposits of copper, nickel and chromium on tinplate is considerably lower than on steel of average quality, but their protective value may be destroyed at bends formed during fabrication especially with coke grades of tinplate. Tinplate of charcoal quality offers the advantages of superior finish, better adhesion of the deposit and a lower tendency for the protective value of the coating to be destroyed on deformation.

Tinplate may also be satisfactorily plated with chromium alone. The plated sheet can be pressed without flaking of the coating, the protective value of which is less readily reduced by deformation than that of the composite nickel-chromium coatings, but it is more difficult to obtain a good finish in the absence of a nickel undercoating.

Surface Improvements of Metals by Etching, (Oberflaechenveredlung durch Aetzen der Metalle), Anonymous. Die Metallwaren-Industrie und Galvano-Technik, Vol. 36, No. 20, 1938, pages 439-442.

Methods are given for the deep etching of metals with the selection of etchants which give sharp boundaries with relatively small evolution of obnoxious gases. The following stop-off coatings are recommended:

Wax	4 parts by weight
Rosin	2 " " "
Pitch	1 " " "

This coating is used as a general stop-off material and is made by melting the above mentioned quantities of materials in a kettle, after which are added 4 parts by weight of finely powdered asphalt. The following stop-off is also recommended particularly as being very hard and possessing good resistance to strongly acid etching solutions:

Black pitch	1 part
Japan wax	2 parts
Rosin	1 part
Dammar gum	1 part

To the above mentioned quantities, melted together in a kettle, is added 1 part of turpentine.

For etching, an entire series of etchants are available but usually dilute solutions of nitric acid are used on metals other than gold or platinum. Strong acids are not suitable because of the lifting of the stop-off material by the evolution of gas resulting in non-uniform and dull etching.

ETCHANTS FOR IRON AND STEEL. Usually dilute solutions of nitric acid (10 to 30%) or 30 parts of alcohol and 64 parts of acetic acid with 10 parts of concentrated nitric acid are used. The alcohol and acetic acid are mixed, allowed to stand for about one hour, after which the nitric acid is added. An acid-free etchant is composed of equal parts of a half concentrated solution of potassium bisulphate and potassium nitrate with the addition of some ammonium chloride.

ETCHING ALUMINUM AND ITS ALLOYS. Hard aluminum is more suitable for etching than soft material as sharper etchings result with the hard material. A good etchant is composed of a 10 to 15% hydrochloric acid solution which has been saturated with sodium chloride.

Some firms use an etchant composed of 100 grams of alcohol, 50 to 100 grams of iron chloride with 1% saccharic acid. If the production of fine lines and shadows on aluminum is desired, the following etching process may be used: the aluminum is immersed about 1 minute in a warm solution (30°C.) of stannous chloride, 30 to 100 grams per litre, in which a thin tin coating deposits upon the surface. The pattern now can be etched into the surface with the above-mentioned hydrochloric acid etchant since this etching solution does not attack the tin but does, however, readily attack the aluminum.

ETCHING OF COPPER AND BRASS. Usually dilute nitric acid solutions are used but for bulk etching, the following solution is recommended:

Water	50 parts
Sulphuric acid	30 parts
Potassium chloride	5 parts
Concentrated nitric acid	15 parts

In place of the hydrochloric acid, iron chloride solutions are occasionally used.

ETCHING NICKEL SILVER AND NICKEL. Nitric acid solutions may be used. The following has proved to be valuable for etching nickel silver: Iron chloride solutions with the addition of hydrochloric acid and potassium chloride, 170 grams of nitric acid, 320 grams of water with 30 grams of potassium bisulphate. A higher content of hydrochloric acid raises the solubility of nickel resulting in strong gas evolution to which the protective coating offers insufficient resistance.

For etching ZINC, dilute solutions of nitric acid are used; for TIN, nitric acid; for LEAD an iron chloride solution to which has been added sodium acetate. During the etching of tin and lead, insoluble reaction products are formed which must be removed by vigorous washing.

ETCHING OF GOLD AND SILVER. The etching as well as the matting of gold and silver is done chiefly by electrolytic means. An etching solution of either 2% silver nitrate or 2% nitric acid is used in which the parts to be etched are made the anode. For chemical etching of silver, 24° nitric acid is used, and for gold, aqua regia which is 1 part of concentrated nitric acid and 3 parts hydrochloric acid.

Post Scripts

I am happy to report that the staff of METAL INDUSTRY escaped the attack by the monsters from Mars who landed (?) in New Jersey on that eventful Sunday night in October but *Joan Trumbour*, METAL INDUSTRY advertising manager, spent several anxious hours awaiting her doom. The reaction to Orson Welles drama seems understandable in view of the propensity towards the high-speed, pot-pourrical life so evident in New York. Here one can see the prototyping of human life—rushing to subways, standing while wolfing breakfasts, reading tabloids. Gum chewing is not a diversion, it becomes part and parcel of the human anatomy apparently emulating bovine rumination in which the tongue dexterously shifts the burden from left jaw to right, all in unison with the clicking of subway wheels. Only yesterday, I saw the acme of concentrated human effort in a native who was drinking coffee, chewing gum, smoking a cigarette and reading a paper while standing at a "catch-as-catch can" lunch counter. Here are some definitions revised a la New York: *Hick*, a person living beyond the Bronx who apologizes when he bowls someone over or who offers his subway seat to aged ladies; *Shoe*, a protective coating over the feet to minimize the abrasions from other people walking upon them; *Escalator*, a moving staircase which people run up to save split seconds; *Celebrity*, a person who wears dark shell glasses at midnight so people won't (?) recognize him. Now that I have divested myself of these Monday morning observations, may I hurry to express the hope that you will plan your vacation in June to attend the Second International Conference on Electrodeposition (Annual Convention of the A.E.S.) at Asbury Park and later visit the wonders of New York and the World's Fair. To you in the hinterland who have never seen the rolling surf of the Atlantic or the lights of the Great White Way, your attendance at the June meeting will long be remembered for these features alone.

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Thanksgiving Day meant more to *Mr. & Mrs. John Oberender* than turkey and "fixins" as they celebrated their 35th wedding anniversary November 24th. When John was asked for a photograph taken on that memorable day in 1903, he said they were too busy being married to be photographed, and so posterity will have to dispense with graphic evidence of the occasion.

Notes from Binghamton and Thereabouts

Maher Suggests Stream-Lining of Faraday's Law

Willliam Maher, President of the Binghamton-Syracuse Branch of the A. E. S. and plating foreman for Hunter Fan Co., claims he is plating nickel with 128% cathode efficiency and said, "Either Faraday or I must be wrong and I am d—— sure it isn't Bill Maher". To quote Bill further: "Faraday discovered his law over 100 years ago, times have changed, things are being stream-lined today, why shouldn't Faraday's law?" Before we put wings on Faraday's law, Bill, may we suggest that perhaps your ammeters aren't exactly veracious and isn't there a wee possibility that you have calculated the wrong effective area? If you want to put Bill on a textile diet try to discover pitting on his work as he told *Austin Fletcher* that he would eat his shirt (only a clean one, we hope) if Austin found pitting on his work.

The Binghamton-Elmira Branch of the A. E. S. has changed its name to the *Binghamton-Syracuse* Branch, which would more appropriately describe its membership. Dinner meetings are held before the monthly meetings at Cortland, N. Y., and the splendid food served has contributed greatly to their popularity.

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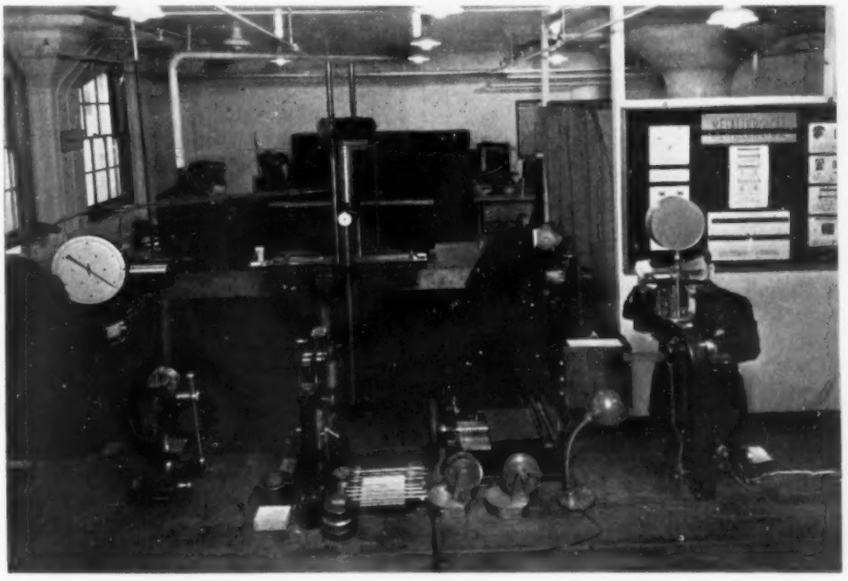
L. C. Conradi, head of the Technical Research Laboratory of the International Business Machines Corp., acted as host to the writer for an inspection of their modern well-equipped laboratories. A new machine for testing the performance of relays and a device for determining dielectric breakdown were features of the electrical laboratory. Believe it or not, they even have developed a machine for grading examination papers by utilizing the conductivity of the pencil marks on the examination paper. Favoritism or human error is no longer possible in grading I. Q. tests.

The weather is no topic of conversation for the paper chemists as they work in a completely air-conditioned room where cli-



HAVE YOU EVER SEEN A BUSIER GROUP OF WORKERS?

The above photograph is a portion of The International Business Machines Corporation's splendid laboratories. Technical Research Director L. C. Conradi is peering into a microscope (he forgot to turn the arc lamp on), Max Taylor is at the Brinell machine on the right (it looks as if your testing wood, Max), Paul Christiansen is pulling something apart on the Amsler in the left foreground, and peeping over the Littrow spectrograph is that producer of fine spectra, K. J. Mackenzie, Asst. to the Technical Research Director.

matic conditions in various parts of the world can be duplicated for testing. My visit to the spectrographic department under *K. J. MacKenzie* proved particularly fruitful. The plates from their B & L Littrow Spectrograph were the best that I have ever seen from a 30" spectrum, being remarkably free from background and having sharp clearly resolved lines as was especially noted in the resolution of the 3100 A lines. MacKenzie's treatment of his electrodes with wax and the short burning time thus made possible, contributed in a large measure, to the absence of background.

Observations from Waterbury

Derrick S. Hartshorn, Jr., Westinghouse chemist, proud pappy of son D. S. H. 3rd on Oct. 12, gave something new on control of pH in nickel plating solutions discussing the pros and cons of lime, nickel hydroxide and nickel carbonate for pH control. Derrick's name will go among the "do or die for old A. E. S." immortals for hitch-hiking 1100 miles to the Milwaukee A. E. S. convention in June. *Bert Sage* furnished transportation for Derrick back to Massachusetts. Westinghouse Electric Mfg. Co. should not have any doubts now of Hartshorn's sincerity in wanting to attend A. E. S. conventions.

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Al Payson, Michigan Buff Co., held the long distance record for the Waterbury meeting traveling from Detroit.

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The absence of *Bob Leather* served as a sad reminder of the death of *Frank Terrio*, former president of Lasalco, Inc., St. Louis, Mo., as Bob was away to attend the funeral. It is still difficult for Frank's many friends to realize that his life's work is done and no greater tribute can be given to his memory than to express the hope that we all can leave this world with achievements, good-will and sense of fullness of life equal to Frank Terrio's.

• •

Newark Branch had almost 25 representatives present led by *Horace Smith* who introduced *Mrs. Smith* as the Chairlady of the Women's Committee of the International Convention. There should now be no doubts as to the success of the ladies' program.

• •

Mrs. Doug MacDermid won a prize donated by *George Morrow* of Egyptian Lacquer Co., and shortly afterwards lightning struck twice in the same place in the form of a second prize. George Morrow's feats of legerdermain were as baffling as ever especially some sugar sleight of hand. George promises to give a real show at Asbury Park. *Bill Ehrencrona* of Casco Products Co., the lucky Swede, won a prize as usual and his perennial heckler Puritan *Gene Phillips*, not to be outdone, won a prize from a competitor. On second thought, the *Editor's* family didn't do so badly either, as *Mrs. Meyer* won her first prize in seven years of meetings, a beautiful comb and brush set donated by *Dr. Hank Kellner*.

• •

Michael J. Dunleavey, Foreman Plater at the Bridgeport works of the General Electric Company, and a member of the Bridgeport Branch of the American Electro-Platers' Society made the headlines recently by setting a new high bowling record. Mike should also merit our sincere admiration for his achievement in sending his three boys through Massachusetts Institute of Technology.

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A clever method for testing porosity of nickel coatings on steel was proposed by *George B. Hogaboom* to the research committee of the A. E. S. The samples to be tested are immersed in a solution of 5 gm./L. of sodium chloride and 0.5 gm./L. of potassium ferricyanide and after a few seconds, blue spots start to form at the pores in the nickel. The test is rapid and particularly valuable for testing for uniformity of the nickel coating.

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The Quaker City Platers Reminder, edited by *Fred Fulforth*, second vice president of the American Electro-Platers' Society, is now in its 11th volume. This little publication could well be copied by other branches of the American Electro-Platers' Society, and if you would like a sample copy Editor Fulforth will gladly furnish you with one.

• •

Joseph Sexton, finishing superintendent, at Sargent & Company, New Haven, Conn., was a member of the Hillhouse High School Football Team, with President Seymour of Yale University. Joe has withstood the attacks of a digestive disorder throughout the past year and although he has lost considerable weight is feeling much better and is on the road to complete recovery. Joe was my boss during my novitiate into the plating industry 10 years ago and he was the most humane and finest leader that the writer has ever had.

Inter-Department Correspondence

To *W. L. Cassell* (Udylite Co., Detroit, Mich.) November 1, 1938. From *Ed. Berry* of Udylite Co.

It will probably surprise the h—— out of you and the boys to learn that the writer is now the proud pappy of a Baby Boy.

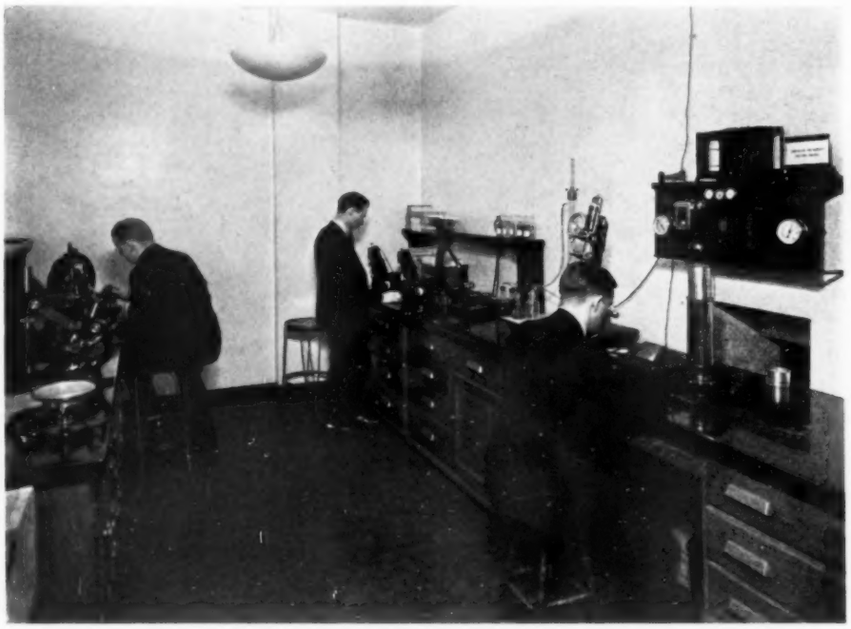
Time: 6:51 AM Saturday Morning (Oct. 29)
Weight: 8 lb.
Hair: ?
Complexion: Red
Lineage: Irish
Name: Patrick

Wishing you the same.

E. F. Berry

P. S. I might have written or called you before but to be truthful I just got down to earth today.

Ed.



PAPER LABORATORY OF INTERNATIONAL BUSINESS MACHINES CORPORATION
Reading left to right F. R. Kintner on Ingersoll Glarimeter for testing surface finish, H. O. George at Folding Tester and M. D. Crandall at the Curl Size Tester.

To globe-trotter *Wilfred S. McKeon* (Liquid Sulfur), thanks for your card, it was sincerely appreciated. My last meeting with Wilfred was in Washington when he was invited by President Roosevelt to attend a meeting of "little" business. We later learned that he was shunted from the meeting and didn't have a chance to give Mr. Roosevelt his sound advice.

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The diction of *W. A. Helbig* Asst. Engineer Darco Corp., used in his talk on "Activated Carbon" to the New Haven Branch of the A. E. S. on Nov. 1st, was almost faultless, and it is seldom that such pure English is used in practical talks to electroplaters without lapsing into some colloquialisms. Mr. Helbig is the author of an article in this issue of METAL INDUSTRY and although a new-comer to electroplating, he is well known for his publications on water treatment.

Dr. W. A. Wesley

Dr. W. A. Wesley, distinguished for his work in the fields of metallurgy and electrodeposition, saw the light of day in Yonkers, N. Y., on August 24, 1902.

Lake Cayuga evidently appealed to him as he spent four years at Cornell University receiving his B. Chem. in 1923. His studies were pursued with brilliance as he was elected to both Phi Kappa Phi and Sigma Xi.

Dr. Wesley married a Windber, Pa., girl, Mary Hartman in 1927 and they have one child, Mary Lou. Dr. Wesley's entire business experience has been with the International Nickel Company at their research laboratory in Bayonne, N. J. His publications have been devoted largely to nickel plating and the effects of various reagents on the corrosion of metals.

In common with most scientists who are engaged intensively with their work, he has developed what he calls a "silly hobby," namely the collecting of match packets issued by restaurants. The collection is strictly limited to unused packets, each obtained by first eating a meal in the restaurant concerned, and this activity has become such a mania that he cannot enjoy a new restaurant until a packet of matches is safely in his back pocket. Dr. Wesley's second and serious hobby is good music.

• •

George Gehling's old mossback was heard again at Newark and I think it will stand re-telling. The story goes as follows: "A plater (of old vintage) was having difficulty with a nickel solution and called upon a chemist to analyze it, whose analysis showed that the solution had merely concentrated from evaporation and only required dilution with water. The plater was called into his bosses' office and was given the chemist's report which read, 'Solution needs 25% addition of H_2O.' The plater looked puzzled for a moment and then said with evident indignation, 'I've done without H_2O all these years in my plating baths and I'll be hanged if I am going to start using it now.'"

Thank You, Nathan

Editor of METAL INDUSTRY:
Dear Sir:

I have just finished perusing the November issue of your METAL INDUSTRY and I think you are to be congratulated on pushing the periodical another step up the ladder of popularity and respect.

In addition to some of the changes we have already talked about, such as type of articles, digests, answers to questions, etc., I want to comment very favorably on the insertion in your editorials of more technical subject matter such as "The Structure of Polished Metal Surfaces", which is really a correlated abstract in miniature and which should bind more closely to your paper the more technically trained individual. Although I have read in detail the original articles you refer to in that editorial, I enjoyed the review and correlation offered by your little resume.

Your Post Scripts, I think, introduce a note of intimacy which is desirable after reading the more formal printed material, and a touch of humor, as in your "Detroit Trolleys," is always welcome. In fact, you might consider inaugurating a little section similar to "Emanations" of the American Chemical Society, "Our Gay Contemporaries" of the London Metal Industry, etc. Such paragraphs serve more than to just amuse. Very often they drive home a serious point, or correct some misused or misunderstood expression or information, with an effectiveness the more conventional approach could not duplicate.

For the individual like myself, who likes convenience to the nth degree, might I make the minor suggestion of adding the volume number to the legend at the bottom of each double page? It facilitates the making of references for those of us who keep bibliographies or abstracts of articles and information of interest.

I am looking forward to your further publications.

With kindest regards and best wishes for continued success.

Yours very truly,
Nate Promisel,
International Silver Co.,
Meriden, Conn.

Philadelphia Meeting A Success

There was a large number of out-of-town guests among the 273 people at the Philadelphia Annual Meeting, some of them being *Bert Daw*, St. Louis, Mo.; *Frank Mesle*, Sherrill, N. Y.; *Carl Heussner*, Detroit, Michigan; *Wilfred McKeon*, Greensburg, Pa.; *Dr. W. E. Stadel*, Cleveland, Ohio; *Floyd Oplinger*, Niagara Falls, N. Y.; *Dr. Blum*, Washington, D. C.; *Bill Kennedy*, Springfield, Mass., as well as a large number of people from New York, New Jersey and Connecticut.

The Newark delegates chartered a bus for the return trip, with *Paul Oldam* and *George Wagner* presenting the musical accompaniment for the vocalizing by the other 28 members during the trip home.

Concentrated sulphuric acid, because of its powerful dehydrating action, can be used to strip japans, high-bake enamels and almost all organic coatings without attacking the basis metal including zinc and aluminum. For cleaning coffee pots, frying pans, waffle iron grids, etc., which have become coated with burnt-on food, concentrated sulphuric acid is very effective. Water will lower its cleaning action and hence the articles should be immersed dry and the acids kept in a covered crock.

• •

The handsome chap in the above photograph is *George Karl*, who celebrates on December 12th his 51st birthday. George has been 30 years in the finishing game; 2 years as a plater at the old Crandell Stone Factory in Binghamton, N. Y., and the other 28 years in the lacquer industry. After the usual high schooling, he wanted to be a chemist and figured that by taking up plating it would help him in chemistry, but after two years of having his feet wet he decided that he would rather sell than be a plater or chemist. During his 28 years in the lacquer business, George has worked out various methods of finishing, one of which is a method of spraying in a tumbling barrel shown in the above photograph. George is still going strong in Connecticut for Maas & Waldstein and reports that he expects to be able to hit all the high spots for the next 25 years.

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First prize for ambiguity of the month goes to Patricia Hall's blurb in her article "Modern Metal Magic" in the New York Herald Tribune's Oct. 23rd Magazine Section in which she states:

"Finishes are not merely applied. They are fused into the metal itself to last as long as the piece does. *They cannot wear off because they are one with the metal all through its thickness*".

The portion which we have italicized is a unique feminine way of saying "The heavy coatings which are alloyed with the base metal are very resistant to wear". "One with the metal all through the thickness" is not as bad as talking about putting a voltmeter in series or of hydrogen overvoltage at the anode. Miss Hall could, however, chuckle at our word tangles if we attempted to write, for example, about fashions in women's clothing.

Merry Christmas

Walter R. Meyer

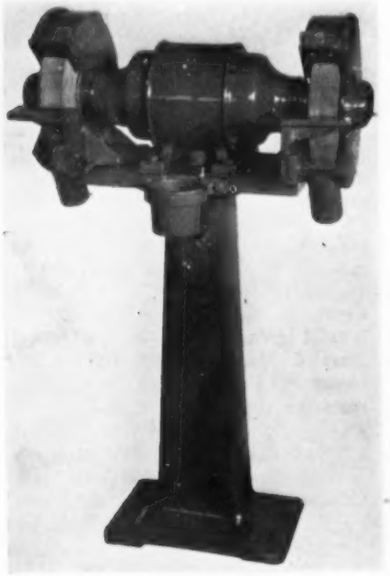
NEW EQUIPMENT AND SUPPLIES

NEW PROCESSES, MATERIALS AND EQUIPMENT FOR THE METAL INDUSTRY

Ball Bearing Pedestal Grinder

The Cadet 12" Ball Bearing Pedestal Grinder was developed by the Standard Electrical Tool Co., 1938 W. 8th St., Cincinnati, Ohio, to meet the demand for a low-priced tool without sacrificing substantial construction, it is stated.

This machine is ball bearing equipped and has capacity for 12" diameter by 2" face grinding wheels. The emery wheel guards are of the safety type, being enclosed and adjustable to the wear of the wheels. Each guard has exhaust outlet, adjustable spark breaker and tool rest.



Ball Bearing Pedestal Grinder

Available for alternating current only and equipment includes three-pole toggle switch and water pot.

Full details may be had by communicating with this company.

New Test Sets for Brass and Copper Solutions

Kocour Co., 4724 S. Christiana Ave., Chicago, Ill., have developed rapid and accurate test sets for brass and copper plating solutions.

It is claimed that these test sets can be used by individuals without technical training to analyze brass and copper solutions with accuracy and rapidity by simply following the directions given with the set.

Conveyorized Three-Dip Degreaser

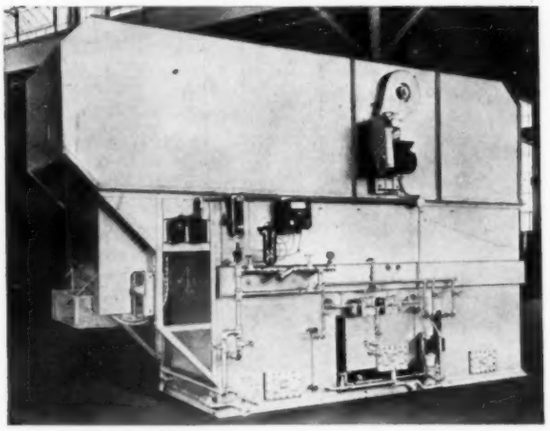
As a recent addition to their line of standard automatic and hand-operated degreasers, the Detroit Rex Products Company, Detroit, Michigan, has recently developed and built the machine shown in the illustration. This machine is used for the removing of oil, grease, and dirt from all kinds of work, such as stampings, castings, and screw machine products prior to painting, plating, inspection and heat treating.

The sequence of cleaning operations, which are performed automatically after the basket of work is hung on the cross rod of the conveyor chain is immersion in boiling solvent, immersion in clean solvent rinse, and final cleaning and drying in pure solvent vapors. The metal parts or assembled products are cleaned with stabilized non-inflammable, non-explosive safety solvents—either PERM-A-CLOR or TRIAD. They are immediately ready for finishing without any scrubbing, mess, or extra dryoff.

This automatic machine is equipped with a return-type crossrod conveyor designed to load and unload at one end and with return flight of conveyor in upper hood. Crossrods, from which baskets of work are hung, are spaced at regular intervals along the two strand conveyor chain. ¾ HP motor drive, speed reducer, and variable speed are mounted on the upper hood and drive the conveyor chain through through-shaft and drive sprockets. Conveyor chain take-up device is located on sprockets at entrance-exit end. Oilless bearings are used on all sprockets inside the vapor zone.

The degreaser is fabricated from steel plate, reinforced with structural steel and of all-welded construction. The inside is hot zinc spray coated after fabrication.

The solvent boiling chamber is heated by a steam jacket bottom and steam coils. This machine is equipped with safety steam pressure relief valve and an air-operated, vapor-actuated temperature indicator and steam control, complete with air filter and pressure reducer, by-pass piping, hand valves, strainer, and steam pressure gauge. It is also equipped with a motor operated solvent transfer pump to return distillate from the third or vapor chamber to the first or boiling chamber. This pump can also be used to transfer solvent into or out of the machine and between any of the chambers. Each of the three chambers (boiling chamber, clean solvent rinse, and vapor chamber) are equipped with removable cleanout doors. The upper hood is fabricated of galvanized steel reinforced with structural steel of welded and riveted con-



Automatic three-dip type DETREX Degreaser equipped with cross-rod conveyor, automatic controls, and arranged for loading and unloading at one end

While this design of machine is built in several standard sizes, the particular unit shown accommodates work up to 36 in. long by 15 in. wide by 15 in. deep and 20 in. hanging. The approximate overall dimensions of the degreaser are length, 12 ft.; width, 6½ ft.; and height 10 ft. It has a total solvent capacity of 250 gals., and the approximate weight is 6,300 lbs.

At a normal conveyor speed of 6 ft. per minute, the rated production cleaning capacity is 2,000 lbs. of work per hour. The minimum production rate is one basket per minute and the maximum production cleaning rate three baskets per minute.

NICKEL DOES A *Sweet* JOB...

How the Ritter Company avoids rejections and cuts machining costs in intricate dental equipment.

Valve casting for distribution of water in Ritter dental equipment. Note number and size of passages, also dense and uniform structure of the Nickel alloy bronze, in cross-sectional view.

THAT smart non-ferrous foundrymen are profiting by the use of Nickel, is evidenced by many new reports. Latest of these is news of all-around improvement effected by Ritter Dental Mfg. Co., Inc., of Rochester, N. Y. in dental "cuspidor" castings of Nickel bronze.

Previously cast in common 85-5-5-5 red brass composition, this part centralizes distribution of water to flush the cuspidor bowl, operates the ejector, and supply water to the tumbler of the Ritter Dental Cuspidor. It is necessarily small and compact – weighs only 2½ lbs. – yet is honeycombed with passages.

Foundry rejections on an intricate casting of this type usually run high. In addition, shrinkage, porosity and other imperfections which show up after some machining expense has been incurred, add to machine shop costs.

By using an 85% copper, 4% tin, 5% lead, 5% zinc and 1% Nickel mixture, notable improvements resulted: the density and uniformity of structure improved so greatly that foundry rejections were reduced to a minimum and machine shop costs substantially lowered.

Consultation on casting problems involving the use of Nickel Brass and Bronze Alloys is invited.

NICKEL BRONZE CASTINGS

THE INTERNATIONAL NICKEL COMPANY, INC., 67 WALL ST., NEW YORK, N. Y.

struction. There is a skylight on top of the hood and a large access door in the back.

The water jacket condenser completely encircles the machine, is stayed and welded. The clean solvent collecting trough for collection of the distillate from the condenser encircles the inside of the machine beneath the water jacket condenser. The return line from solvent collecting trough is equipped with two water separators and vapor traps. The distillate returns to the rinse chamber, thus continuously renewing it and keeping it clean during operation. The rinse, in turn, overflows into the third or vapor chamber, and this solvent overflow is returned to the boiling chamber by a continuously operated motor driven solvent transfer pump. The pump is arranged with necessary piping so the solvent can be transferred between any of the chambers in the machine and for filling or emptying the machine conveniently.

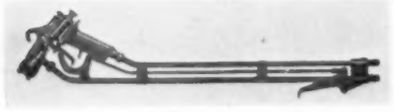
Extension Handle for Spray Guns

A new type extension handle which adapts the company's heavy duty high speed MBC gun to extension spray painting work has been announced by The DeVilbiss Company.

The handle is designed specially to combine the convenience of an extension gun in many classes of contracting, railroad and industrial painting with the higher quality of work done by the standard MBC gun.

The extension is light in weight and properly balanced. Location and construction of the trigger are such as to make operation as simple as with the gun itself.

Nozzle of the gun is tilted at a forty degree angle from the line of the handle. This facilitates spray-coating of walls, ceilings, structural work and maintenance jobs which are difficult with a gun alone.



Extension Handle for Spray Gun

The extension is rigidly constructed of air and fluid tubes, held by clamps and soldered into a strong casting at the inlet end. Extension trigger is attached to this casting, and operates the gun by a simple ball crank system.

The new handle has the same combination of air and fluid connections as are available on the MBC gun, and may be attached or removed in a few moments. Standard lengths are 3, 4, 5, 6, 8 and 10 feet. Eight and ten foot lengths are specially reinforced.

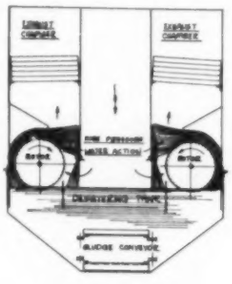
Complete information on the new MBE Extension Handle for use with the MBC Gun may be secured from The DeVilbiss Company, Toledo, Ohio.

New Air Cleaning Unit

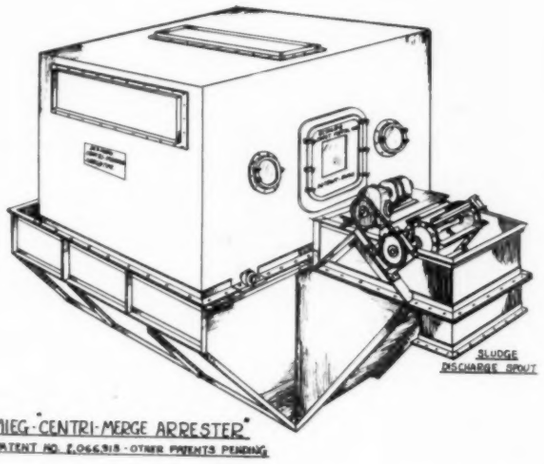
The Centri-Merge Arrester Unit, a development of the Schmieg Sheet Metal Works, 312 Piquette Ave., Detroit, Mich., employs a new and revolutionary method of air cleaning.

This principle consists of drawing the air to be cleaned through a first stage high velocity vertical cataract of water where a large percentage of the foreign material concentration in the air is removed. The second stage of this high pressure water action removes the finer particles of foreign material by pounding the air with great force against the front impingement plate, breaking up the air bubbles in the water in which most of the finer dust particles travel. This horizontal second stage of water action is travelling at a higher velocity than the air, which causes the air to be forced toward the impingement plate, from where it enters the expansion chamber above and then through the moisture eliminators to the exhaust fan.

The Centri-Merge arrester unit is ruggedly constructed and compact in size. Its design makes it flexible in respect to limited space applications. It has a self contained dewatering tank and is supplied with or without a sludge conveyor.



CROSS SECTION



SCHMIEG-CENTRI-MERGE ARRESTER
U.S. PATENT NO. 2,066,918 - OTHER PATENTS PENDING

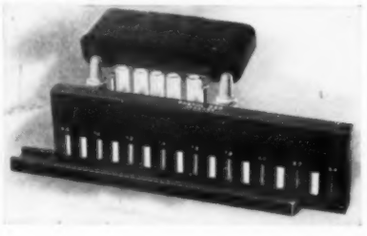
The Centri-Merge principle is applicable to spray booths, acid tank ventilation, dust collecting and exhaust systems, or wherever heavy concentrations of dust or fumes are to be removed from exhaust air.

Over 300 Centri-Merge units ranging in capacities from 1,000 C.F.M. to 40,000 C.F.M. on varied applications such as dusts, acid fumes and spray booths, have been built and are claimed to be operating efficiently and satisfactorily.

New pH Slide Comparator

A new slide Comparator for the colorimetric determination of pH, chlorine and phosphates has been developed by W. A. Taylor & Co., 872 Linden Avenue, Baltimore, Md.

The new outfit is molded entirely from plastic. Radical changes in design have resulted in marked improvement in appearance, durability and ease of handling. The weight has also been considerably reduced. All pH, chlorine and phosphate values, as well as the indicator names, are engraved in white directly on the plastic slides. Improved catches are used to hold the top on the base and all metal parts are rustproof. The whole outfit, including the slide is 10 in. long, 2⅛ in. wide and 4 in. high and weighs only 1½ lbs.



pH Comparator

The new Comparator consists of a slide and a base. Each slide contains 9 color standards alternating with ampoules of distilled water. All color standards are guaranteed by the manufacturer to maintain their accuracy for a period of 5 years.

The base contains 2 vials of indicator solution, with 0.5cc pipettes, 5-5cc test tubes, and a piece of etched glass in a special compartment. Determinations are made by filling three of the test tubes with the test sample, adding 0.5cc of indicator solution to the middle one, placing the slide on the base and moving it back and forth until the test sample matches one of the color standards. The pH, chlorine or phosphate value is then read off directly from the values on the slide. One base can be used with any number of color standard slides. Full information on these outfits can be obtained from the manufacturer.

Metal Cleaning Process

MacDermid, Inc., Waterbury, Conn., have perfected a new method of metal cleaning called the Anodex method.

The Anodex compound is an alkaline material with special addition agents which insure greater penetration and current carrying ability, it is stated. It is a white powder 100% soluble in hot water.

Anodex is used electrically at 12 ozs. to the gallon. It can be used in any type steel tank equipped with steel nickel plated anodes. The electrical connections should be capable of carrying enough current to enable one to clean at approximately 50 amperes per sq. ft. Anodex is claimed to eliminate, in many cases, solvent degreasing, safety solvent cleaning, alkaline soaking tanks and wet rolling for cleaning purposes. Each of these operations has to be followed by at least one additional cleaning operation. After cleaning in Anodex, the only other operation is a water rinse.

The manufacturers claim the following mechanism: Anodex not only chemically cleans the work but brings out all the original lustre of the base metal. Because of its deep penetration and gassing due to the oxygen liberation, the incrustations and impregnations in the pores of the base metal are physically forced out. The oxygen bubbles formed at the work are so small that they get under the oil and dirt particles forcing them off rather than surrounding the oil particles as do the hydrogen bubbles liberated during ordinary alkaline cleaning. The surface of the work after cleaning in Anodex is clean and bright. It is found that the throw of metal into recesses is much deeper and consequently the bright range of plate and the corrosion resistance are greatly increased.

By the purchase of a high lustre steel many firms find they can take work directly from the press room, clean in Anodex and plate in Bright Nickel with no prior finishing operation.

Strip steel cleaned in Anodex and electrogalvanized or nickel plated is claimed to have a better adherence and a more uniform color.

A simple five-minute titration checks and maintains the correct concentration of Anodex compound.

Metal Spray Gun

The Turner Brass Works, Sycamore, Ill., announces the manufacture of a new metal spray gun in which the heat is furnished by a sturdy blow torch with low fuel cost of a claimed consumption of 5c worth of gasoline for 4 hours of operation.

The gun operates under low air pressure and volume with any standard rods or bars of solder. The instrument also has instantaneous control of spray from fine to coarse and on or off, together with a reserve of molten metal to maintain temperature under heavy use.

The metal spray gun has been recommended for:

Automotive body work.

Rapid, inexpensive pattern and corebox work.

Fine, detailed duplication.

Rust proofing.

Decorative and art work.

Covering non-metallic objects for plating and oxidizing.

Miniatures of new products for sales and promotion work.

Inexpensive scale models for design approval.

Fire protective covering.

Corrosion protection.

Advertising novelties.

The Common Sense of it

On the well founded belief that firms using gold for plating would welcome the opportunity to avoid making their own solution, we developed and marketed

ROBINSON'S ASSAYED GOLD PLATING SOLUTION

Its appeal was immediate and unmistakable. Manufacturers and platers found that there was waste in making their own. There was the cost of time and labor, in addition to the cost of chemicals. There was danger from acid fumes. There had to be valuable space allotted to it. And, most important, there was the failure to get uniform results.

We sell you so much GOLD (certified)—not so much liquid.

Economical, because priced so near raw gold cost. Efficient, and containing an inhibiting addition agent.

Industry moves ahead, looking always for something better. Gold plating with ROBINSON'S ASSAYED GOLD PLATING SOLUTION makes for better gold plating.

The larger your gold consumption the more need for prompt investigation.

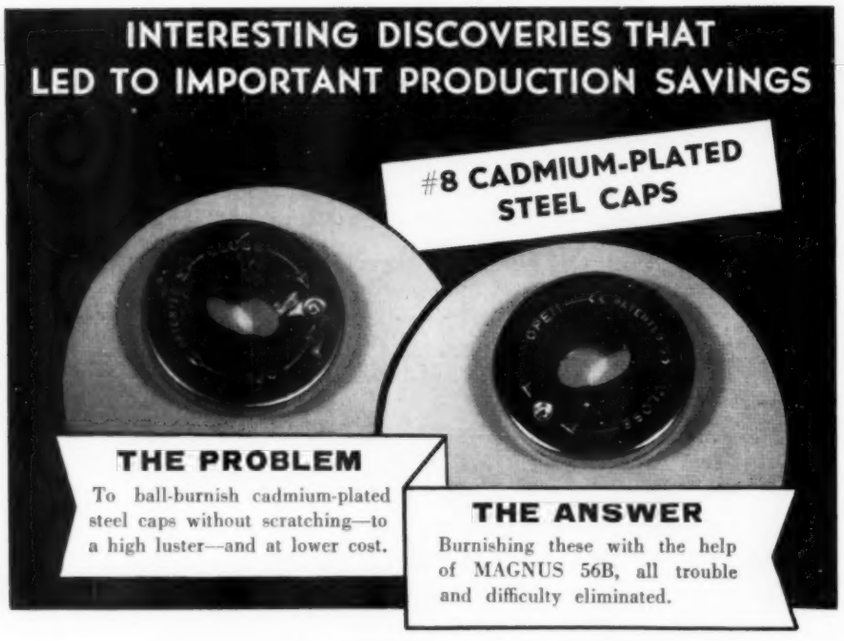
Let Dr. C. B. F. Young, now chief of our Research Staff, advise you.

A. ROBINSON & SON

"Sixty Years at Precious Metals"

131 CANAL ST. NEW YORK

Keep your stock solution in your safe, along with your other valuables, until needed for replenishment.


INTERESTING DISCOVERIES THAT
LED TO IMPORTANT PRODUCTION SAVINGS
#8 CADMIUM-PLATED
STEEL CAPS
THE PROBLEM
To ball-burnish cadmium-plated steel caps without scratching—to a high luster—and at lower cost.
THE ANSWER
Burnishing these with the help of MAGNUS 56B, all trouble and difficulty eliminated.

The above photographic story shows how the use of MAGNUS No. 56B enabled a manufacturer of cadmium-plated steel caps to completely eliminate metal to metal contact in the barrel. This previous condition had caused scratching the surface of the plated caps.

MAGNUS No. 56B provides the necessary lubrication in the barrel, preventing abrasion of the metal surfaces and developing the high luster which the manufacturer desired.

Let us show how Magnus Burnishing Soaps and Metal Cleaners will cut your costs, give you better work and help increase your profits.

Write today for a nearby Magnus Service Representative to demonstrate to you under your plant conditions. Or, send us the details of your operations for our specific recommendations. No obligation in either case.

MAGNUS CHEMICAL COMPANY

Manufacturers of Cleaning Materials, Industrial Soaps, Metallic Soaps, Sulfonated Oils, Emulsifying Agents and Metal Working Lubricants.

11 South Avenue Garwood, N. J.

MAGNUS CLEANERS

New Materials for Tank Lining

During 1938, the Engineering Department of the United States Stoneware Company has developed a new lining for steel, wood or concrete tanks used for the pickling of such products as stainless steel. This new lining material, known as "TYGON", is entirely resistant to attack by hot oxidizing agents, which quickly deteriorate rubber linings.

In the past, it has been impossible to use rubber-lined metal tanks, when hot concentrated oxidizing solutions were required for pickling work. For about ten years, the use of rubber-lined tanks for the pickling of ordinary steels has become almost standard practice. With the increasing use of stainless steel, the industry has been confronted with the problem of finding a lining for steel tanks which would prove as satisfactory in this service as rubber-lined equipment is for conventional pickling. This problem was finally solved by the development of the special type of "TYGON" lining construction.

"TYGON" is a synthetic rubber entirely immune to attack by nitric acid. It was found utterly impractical to attempt to apply pure sheets of "TYGON" to the inside surfaces of pickling vessels. A construction was finally developed which comprises the calendaring together of a number of fabric sheets which have been thoroughly impregnated with "TYGON", and subsequently applying these built-up sheets to the walls of the steel, wood or concrete tank. The joints between lining sheets are welded together with strips of the same material used for the main lining. A special adhesive has been developed to bond the lining to the tank walls. The same practice of sheeting with acid-proof brick and cement for mechanical and thermal protection that is followed for rubber-lined pickling tanks is used in "TYGON" linings. This sheeting with acid-proof brick and cement serves the dual function of protection to the lining from mechanical damage, and from excessive temperatures. "TYGON"-lined tanks are completely resistant, not only to hot oxidizing agents, but to all other acids, including hydrofluoric, alkalies, hydrocarbons and most solvents.

Due to the increased demand for a cheap lining material which can be applied in the field to small or large tanks used for plating, pickling or acid storage, a new series of materials, known as "RUPLASTOID", have been completed.

The "RUPLASTOIDS" answer the demand for relatively inexpensive lining materials resistant to a wide range of plating and pickling solutions, which can be purchased at a sufficiently low price that even temporary tanks can economically be lined with it. The "RUPLASTOIDS" are thermoplastic materials which will not flow under heat, and are very resistant to cracking, even at low temperatures. The material is available in several grades suitable for use from 200°F. down. It is available in three forms—bulk, sheet or paste. The bulk material can be applied to cleaned surfaces by melting and pouring into place.

The sheet material, which is available in thicknesses from ¼″ up to 1″, can be cemented to the tank walls, and the joints between sheets heat welded with a blow torch. The paste form is a modified emulsion which can be trowelled onto the tank surfaces and sets to form a firm and flexible coating. All of the "RUPLASTOIDS" are resistant to all acids and solutions, except those which are highly oxidizing, and solutions containing solvents or hydrocarbons.

"RUBBER-X" Linings may be applied in the field by painting or spraying "RUBBER-X" material onto clean metallic wood or concrete surfaces. "RUBBER-X" is an improved, self-curing pure latex emulsion. The linings are built-up by applying a number of films of "RUBBER-X" allowing sufficient time for drying between each application. Coatings from 1/32″ up to ¼″ thicknesses can be applied in this manner. The finished lining is a one-piece rubber membrane thoroughly bonded to the tank walls and resistant to all plating and pickling solutions which standard rubber linings are able to handle. For protection from mechanical shock or excessive temperatures, "RUBBER-X" Linings can be sheeted with acid-proof brick and cement.

Brightening Agent for Plating Solutions

Linick, Green & Reed, Inc., 29 E. Madison St., Chicago, Ill., have announced the marketing of Tantol, an all around brighten-

ing agent. Although well tried for several years, it has only lately been placed on the market. This material is produced by the gas method U. S. Patent No. 1,777,121 by use of two tubular tantalum electrodes on alternating current of low voltage. The solution is said to be non-colloidal and free from metals except for a trace of tantalum.

Tantol comes in 10 c.c. and 16 ounce bottles ready for use. Added to a plating solution at about 1 c.c. per gallon or 3½ ozs. for 100 gallons, it is claimed to produce a bright plate on articles previously color-buffed. It has been successfully used with rhodium, gold, silver, cadmium, nickel, copper, chromium, cesium, brass, etc. It is claimed that with this addition agent greater current densities may be used and there is a noticeable saving in buffing time, plating time and metal because all of the metal plated out remains on the article. Tantol is said not to cause embrittlement.

Manufacturers' Literature

Buffing and Polishing Compositions. Describing the *Speedie* line of buffing and polishing compositions. Graphically illustrated with candid camera "shots", the booklet provides detailed information as to the different uses of the various compositions, giving suggestions for the correct type of composition to be used on special metals. The Buckeye Products Co., 7000 Vine St., Cincinnati, Ohio.

Metal Parts Washing Machines. A folder on *Blakeslee* washing machines for stampings, punchings, deep draws, castings, metal assemblies, nuts, bolts and all screw machine products prior to painting, enameling, lacquering, etc. G. S. Blakeslee & Co., Cicero Station, Chicago, Ill.

Galvannealed Sheets. A 12-page folder including details on advantages of galvannealed sheets, corrosion resistance, forming, uniformity, coating, uses, grades and finishes, chart on gauges and sizes, and table of extras for widths and lengths. Bulletin Adv. 312. Republic Steel Corp., Cleveland, Ohio.

High Speed Copper Electroplating Process. Technical service bulletin giving information on the duPont *High Speed* copper plating process. E. I. duPont de Nemours & Co., Inc., Electroplating Division, Wilmington, Dela.

Heating Equipment Engineering Data. A catalog describing and illustrating *Industrial* heating equipment, such as thermo insulated high temperature exhausters, gas and oil fired heating units, and precision air draw furnaces. Industrial Gas Engineering Co., 201 E. Ohio St., Chicago, Ill.

Resist Corrosion Alloys. A price list, effective Sept. 15, 1938, on *Hastelloy* alloys. Haynes Stellite Co., Kokomo, Ind.

CHROMIC ACID

Recognized as the world's largest manufacturer of chromium chemicals, Mutual brings to the plating industry a basic source of chromic acid.

Our facilities cover every step in its production, from the mining of the chrome ore on a remote island in the Pacific to the wide distribution of the finished product through warehouse stocks in the principal consuming centers.

MUTUAL CHEMICAL CO. OF AMERICA — MUTUAL — NEW YORK, N.Y.

CHROMIC ACID
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BICHROMATE OF SODA
BICHROMATE OF POTASH

Mines in New Caledonia
Plants at Baltimore and Jersey City
Warehouse stocks carried in all principal cities.

MUTUAL CHEMICAL CO. OF AMERICA
270 Madison Avenue, New York City

Engineering Properties of "K" Monel. Bulletin T-9, revised as of Oct. 1938. Development & Research Div., International Nickel Co., Inc., 67 Wall St., N. Y.

Corrosion of Metals by Oliver P. Watts, Associate Professor, Emeritus in Chemical Engineering, Bulletin of the University of Wisconsin, Engineering Experiment Sta. Series No. 83, Madison, Wisc.

Control Instruments for Gas-Fired Ovens and Furnaces. Bulletin 521. Describing *Bristol's Pyrotrol* designed primarily for use on gas-fired industrial heaters, such as are used with large enameling ovens, bright-annealing ovens, etc. The Bristol Company, Waterbury, Conn.

Dust Sampling. The *M.S.A. Midget Impinger* (Bulletin CT-1) is featured as the latest development in dust sampling apparatus employing the accurate impinger method. Mine Safety Appliances Co., Braddock, Thomas & Meade Sts., Pittsburgh, Pa.

Variable Speed Transmission. Folder describing and illustrating *Ideal Thermo-Grip* electric soldering tools. Ideal Commutator Dresser Co., 1236 Park Ave., Sycamore, Ill.

Hard-Facing Wearing Surfaces by the Oxy-Acetylene Process. A revised folder presenting data on the different grades of Haynes Stellite hard-facing rod. Haynes Stellite Co., 205 E. 42nd St., New York.

An Instrument for Measuring Surface Roughness. A folder containing information on the *Profilometer*, which measures a running average of the height of the irregularities which constitute the roughness of the specimen. Physicists Research Co., 343 S. Main St., Ann Arbor, Mich.

Greater Industrial Safety. A new booklet briefly outlining modern cleaning methods and materials which promote increased safety of plant, products and personnel. Oakite Products, Inc., 14 Thames St., New York.

BACKED BY EXPERIENCE

Harshaw anodes and chemicals are produced by tried and proven methods of manufacture—methods developed through thirty years research in cooperation with customers . . . Every phase of the plating operation has been considered in this development of better anodes and chemicals . . . Depend on Harshaw Quality for continuous production and best results.

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Manufacturers, Importers, Merchants
Offices and Laboratories: Cleveland, Ohio
Quality products since 1892

New York, Philadelphia, Chicago, Detroit, Pittsburgh, Cincinnati, East Liverpool, Los Angeles, San Francisco. Works at Cleveland and Elyria, Ohio and Philadelphia, Pa.

What the Reader Says

Titration of Copper with Thiosulphate

Nov. 1, 1938.

Editor of METAL INDUSTRY:

Having been asked recently to check a copper cyanide solution for one of our customers, I followed the method for metallic copper given in your "Platers' Guidebook" on page 50 of the 1937 edition. On titrating with sodium thiosulphate, I obtained an extremely poor and indefinite end point which seemed to render the method almost worthless. With a sample of pure copper I obtained an excellent sharp end point, as is usually the case.

I then noticed that, on the addition of ammonia to another sample after destruction of cyanide with sulphuric and nitric acids, there was a precipitate in suspension which was hardly noticeable in the dark blue solution. On removal of this precipitate by filtration and then continuing the procedure as given, I now obtained a sharp end point. The precipitate was probably iron or aluminum hydroxide; I did not examine it further.

This precaution may be familiar to most of our readers who use this method regularly but might be worth mentioning for others using it only occasionally or for the first time.

Very truly yours,
BRUCE PRODUCTS CORP.
A. D. Gaskin
Chief Chemist

Howell, Mich.
Nov. 7, 1938.

Mr. A. D. Gaskin:

Your advising us of this experience with the titration for copper is appreciated. If all readers of the Guidebook would write in with such suggestions it would be possible to improve the quality of the material presented.

It would appear as though you have answered your own question correctly. The precipitate was more likely iron than aluminum as many of the copper cyanides on the market have a high iron content. Sodium cyanide itself contains iron. In case of such precipitation it is advisable to filter as you did.

It is also possible that you had a Rochelle salt copper solution. This will produce a black precipitate due to carbonization of the Rochelle salts. Usually this char can be cleared up by the addition of more sulphuric and nitric acids and continuing to heat to fuming until a clear solution has been obtained.

Other impurities which may occur in a cyanide copper are lead and sulphur (the latter from the use of hypo as brightener). Ordinarily, however, these elements should cause no trouble in the analysis. The lead would go down as lead sulphate and would not interfere in the titration.

George B. Hogaboom, Jr.
Newark, N. J.

New Books

Oxyacetylene Welding, by Robert H. Kehl, revised by Morgan H. Potter. Published by American Technical Society, Chicago. Size 8½" x 5½"; 125 pages. Price $1.25.

Another little booklet in the splendid "how-to-do-it" series, discussing rather completely the various phases of oxyacetylene welding.

The book is well printed and illustrated in keeping with the preparation of this whole series of books. Some of the chapters are: Technique of oxyacetylene welding; Welding for different metals; Steel welding; Cast-iron welding; Welding at vertical and overhead positions; Bronze welding process; Hard-surfacing; Silver soldering; Oxyacetylene torch; Malleable-iron welding; Welding white metal or die castings; Aluminum welding; Copper welding; Brass and bronze welding; Cutting and lead burning; Welding in automobile repair work; Design of jigs for oxyacetylene welding; Costs of welding.

Forging Practice, by Carl Johnson. Published by American Technical Society, Chicago, Ill. Size 5½" x 8½"; 136 pages, 122 illustrations and tables. Price $1.50.

Another practical book on hand forging of wrought iron, machine steel, tool steel, drop forging, heat treatment of steel including annealing, hardening and tempering.

The book is remarkably well illustrated and the photomicrographs of the structures of the worked metals are especially good.

This book is recommended as an elementary general treatise on the subject of forging practice.

Government Publications

Report of Investigations. 3419 *Progress Reports.* Metallurgical Division. Annual Report of the Metallurgical Division, Fiscal Year 1937-1938. By R. S. Dean and others. U. S. Department of the Interior, Bureau of Mines, Washington, D. C.

A Study of Explosives Accidents Reported to the National Safety Competition, 1925-1935. By W. J. Fene. I. C. 7038. U. S. Department of the Interior, Bureau of Mines, Washington, D C.

Progress Reports-Metallurgical Division. Fixation of Sulphur from Smelter Smoke. R. I. 3415. U. S. Department of the Interior, Bureau of Mines, Washington, D. C.

Technical Publications

1938 *Supplement to Book of A. S. T. M. Standards.* Published by American Society for Testing Materials, 260 S. Broad St., Philadelphia, Pa.

Non-Ferrous Metals Committee Report by Ralph D. Hawkins, Chairman Bridgeport Gas Light Co., Bridgeport, Conn. American Gas Association, 420 Lexington Ave., N. Y.

Associations and Societies

American Electro-Platers' Society

Philadelphia Branch

The annual banquet and educational session of the Philadelphia Branch of the A.E.S., held on Saturday, November 19, was one of the most successful in recent years with 273 persons in attendance at the banquet. The educational session was attended by a large number of interested spectators, to hear papers presented by *Floyd Oplinger* of the duPont company, on "Copper Plating from Cyanide Solutions"; *Burton G. Daw,* vice-president of Lasalco, Inc., St. Louis, Mo., on "Practical Demonstration of What Happens in a Plating Barrel"; *George B. Hogaboom* of Hanson-Van Winkle-Munning Co., Matawan, N. J., who spoke on "Production of Special Finishes," and *W. E. Stadel* of McGean Chemical Co., Cleveland, Ohio, on "Bright Nickel Plating."

A. Robson was chairman of the educational session and *Paul Mentzer* was chairman of the banquet committee. The officers for the current year of the Philadelphia Branch are as follows: *Joseph T. Underwood,* president; *Frederick Fulforth,* vice-president; *Robert E. Jackson, Jr.,* secretary-treasurer, and *Eugene J. Lurbach, Jr.,* librarian.

New York and Newark Branches

Ralph J. Ligouri, President of the New York Branch, and *John Kotches,* President of the Newark Branch, announce that arrangements have been concluded for the holding of a joint Educational Session and Banquet-Dance on the afternoon of Saturday, February 18th, 1939. The meetings will be held in the Salle Moderne and Roof Garden of The Hotel Pennsylvania, New York City, N. Y.

For further information write to *F. J. MacStoker,* Secretary, 25 Princeton Street, Garden City, N. Y.

New Haven Branch

W. A. Helbig, assistant engineer in the Sales Division of the Darco Corporation, New York City, presented a talk at the November 1st meeting of the New Haven Branch on "Activated Carbon in the Electroplating Solution."

Mr. Helbig discussed the manufacture of activated carbon, various industrial uses of this material and its specific use for purifying bright nickel plating solutions.

An interesting discussion on filtering of solutions and purification of solutions took place after his talk.

Joseph T. Sullivan of New Haven Clock Company, New Haven Conn., was technical chairman.

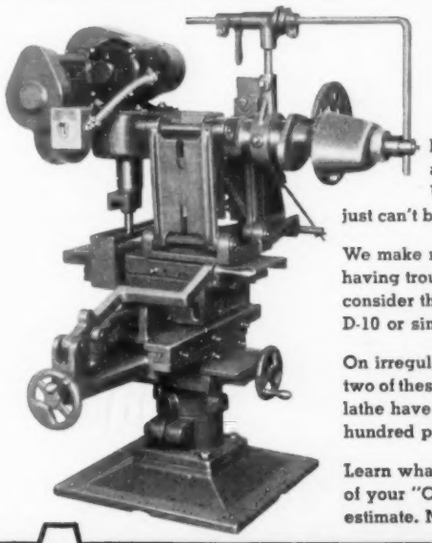
Newark Branch

Dr. Louis Weisberg, Louis Weisberg, Inc., N. Y., spoke to the Newark Branch on December 2, 1938, the subject of his talk being "Methods of Purifying Nickel Plating Solutions."

Frederick Fulforth of Proctor & Schwartz, Inc., Philadelphia, Pa., is scheduled to address the branch on December 16th on the subject of "Constructive Pre-Plating Methods," and the January 6th meeting will be addressed by *George B. Hogaboom* on "Production of Special Finishes."

ACME "D-10" OSCILLATING AUTOMATIC

Chuck illustrated holds triplicate set aluminum pot —one of several arrangements used on the D-10.



In polishing and buffing there often comes along a tartar that nobody likes to tackle. Usually it's an "Out-of-Round" job that just can't be finished economically by hand.

We make no claim to greater courage. But if you're having trouble "taming a tough one"—by all means consider the Acme Method of doing the work with a D-10 or similar automatic.

On irregular shapes like roasting pans, kettles, etc., two of these machines in conjunction with a standard lathe have stepped up production efficiency several hundred per cent in many plants.

Learn what the D-10 has to offer you. Send samples of your "Out-of-Round" work for prompt production estimate. No obligation.

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Detroit Branch

The annual meeting of the Detroit Branch of the A.E.S. will be held Saturday, December 10th. The following educational program will be presented:

Dr. Oliver P. Watts who will speak on "Corrosion of Metals"; *Dr. Walter R. Meyer* on "Metallic Addition Agents and Impurities in Plating Solutions," and the third speaker will be *H. H. Rennell.*

Charles Eldridge will be chairman with *R. L. Redmond*, and *R. B. Saltonstall* as other members of the committee.

Waterbury Branch

The Waterbury Branch held it's second annual educational session and banquet on Saturday, November 5th with over 200 in attendance.

W. J. R. Kennedy, executive secretary of the American Electro-Platers' Society, was chairman of the educational session in which papers were read by *George B. Hogaboom* on "Production of Colored Finishes on Metals; *Oscar A. Stocker*, chief electrochemist, Seymour Mfg. Co., Seymour Conn.; *Derrick S. Hartshorn, Jr.*, Westinghouse Electric & Mfg. Co., Springfield, Mass., on "Testing the pH of Nickel Solutions."

A.S.M.E. To Present Awards At Annual Meeting In New York

A list of the 1938 honors and awards, to be presented on "honors" night, December 6th at the 59th annual meeting of the *American Society of Mechanical Engineers* in New York City was announced by *C. E. Davies*, secretary of the society. An attendance of more than 3,000 engineers from all parts of the United States and Canada is expected at the meeting.

Awarded for some great and unique act of genius of engineering that has accomplished a great and timely public benefit, the Holley Medal will be given to *Francis Hodgkinson*, member A.S.M.E., professor at Columbia University, and consulting engineer, 138 E. 36th Street, New York City, for "meritorious services in the development of the steam turbine."

Bestowed for an outstanding contribution to permanent engineering literature, the Worcester Reed Warner Medal will be presented to *Lawford H. Fry*, member A.S.M.E., and railway engineer, Edgewater Steel Company, Pittsburgh, Pa., for "written contributions relating to improved locomotive design and utilization of better materials in railway equipment."

Presented annually for an original paper or thesis of exceptional merit presented before the society, the Melville Medal for 1938 will be awarded to *Alphonse I. Lipetz*, member A.S.M.E., and chief consulting engineer in charge of research, American Locomotive Company, Schenectady, N. Y., for his paper on "The Air Resistance of Railroad Equipment."

American Welding Society

The New York Section of the American Welding Society has arranged lecture courses on the Fundamentals of Welding, to be held at the Polytechnic Institute of Brooklyn, N. Y.

A series of 12 lectures have been arranged with prominent authorities in the welding field as lecturers.

The Handbook of the Welding Society will be used as a text and admission will be free for the first lecture and the entire course for members of the American Welding Society. For non-members, there will be an enrollment fee of $5.00 for the full course, which may be applied against the cost of membership.

The lectures for December are: December 6—Lecture No. 3.— Welding of Nickel and Its Alloys, by *F. G. Flocke*, Welding Engineer, International Nickel Co., New York. Welding of Nickel Steels, by *T. N. Armstrong*, International Nickel Company. December 20—Lecture No. 4.—Aluminum Alloys, by *G. O. Hoglund*, Welding Engineer, Aluminum Company of America, Pittsburgh, Pa. Copper and Copper Alloys by *I. T. Hook*, Research Engineer, American Brass Co., Waterbury, Conn.

American Society for Metals

A demonstration lecture on the processes of corrosion was given Oct. 26 before the Newark Chapter of the American Society for Metals by *F. L. LaQue* of the International Nickel Company.

Calling his talk, "Corrosion, What is it?", Mr. LaQue showed actual metallurgical experiments as well as lantern slides to demonstrate 23 processes involving effects of corrosion on various metals and alloys.

The lecture was the first of an educational course which is being conducted by the Newark Chapter of the American Society for Metals. Mr. LaQue, a member of the Development and Research Division of the International Nickel Company in New York, gave a second lecture in the series entitled "Corrosion, How can it be Combatted?" on November 2.

Stainless Steel Polishing Compounds

The 4A brands are highly efficient for cutting down, polishing, and mirror finishing all kinds of steel including radium and stainless. The compound is used on all kinds of wheels, soft, medium, and hard wheels.

Instead of Glue use 4A Cement & Thinner, a uniform substitute for polishing Wheels, Belts, Buffs, Rolls, Etc. Samples of Compound or Cement Sent on Request.

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Obituaries

Frank E. Terrio

Frank E. Terrio was born in Dorchester, Wisconsin December 5th, 1879. He was of French-Canadian parentage, and one of a large family. Mr. Terrio died October 31, 1938.

When seventeen years old he moved to Chicago and started to work as a scrub boy in a plating plant. He seemed to have a natural ability along these lines, and worked in Chicago for some little time, after which time he was with the Grand Rapids Brass, and later on, in a small job shop in Fond Du Lac, Wisconsin. He went from there to Chicago Heights where he was the Plater for a Furnace Company making large cast iron registers. He contracted pneumonia which nearly ruined his health, and the doctor insisted if he wanted to live he would have to take an outside job.

At which time, Mr. Terrio was successful in obtaining employment as a salesman with the E. Reed Burns Company in their Chicago Branch. In a short time he was made Branch Manager to this Company, and was with them in that capacity for approximately fifteen years, during which time he traveled in Wisconsin, Iowa, Illinois, Missouri, Indiana, Michigan, and occasionally into Ohio.

In 1919, Mr. Terrio and two other men started the St. Louis Platers Supply Company, where they manufactured Buffing Compositions, Buffs and Polishing Wheels, and this was the first Buff Factory west of Utica, New York. In later years the name was changed to Lasalco, Inc., and the original partners in the business sold out their interest to Mr. Terrio and Mr. Hedley J. Richards, who is now retired. In 1927 and 28 the Company started in the manufacture of Plating Barrel Equipment, Burnishers and other types of Equipment in the electroplating and polishing fields, and under Mr. Terrio's able leadership, the Company has steadily progressed. Although comparatively a young man, Mr. Terrio had probably as many active years on the road as any other salesman in the Industry.

Mr. Terrio is survived by his Widow and Daughter, Mrs. Irene Crabb.

Lester T. Wilson

Lester T. Wilson, manager of metal sales, National Lead Company, died suddenly November 3rd at his home in Middletown, N. J. His widow, Anna Nelson Wilson, survives. Services were held at St. Mary's Catholic Church in New Monmouth, N. J. Mr. Wilson, who was 47 years old, was a graduate of the Armour Institute of Technology. He joined the National Lead Company in 1914 and saw service overseas during the war. Upon his return, he was connected with the research laboratories and then went to Chicago as general superintendent of the Chicago branch plants. In 1925 after his return to New York, he was made general manager of the Metallurgical and Chemical Corporation, a National Lead Company subsidiary, at Matawan, N. J. He was appointed manager of metals sales in 1933.

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MULTIPLE BURNER

Gas Fired

METAL MELTING FURNACES

Break all Records for Economical Melting of Metals

REDUCE: Metal Losses, Melting Costs, Fuel Consumption, Variation in Analysis, Variation in Temperature.

INCREASE: Crucible Life, Lining Life, Purity of Metals.

Patent claims have been allowed on the revolutionary principles of Hausfeld Multiple Burner, Gas Fired Furnaces.

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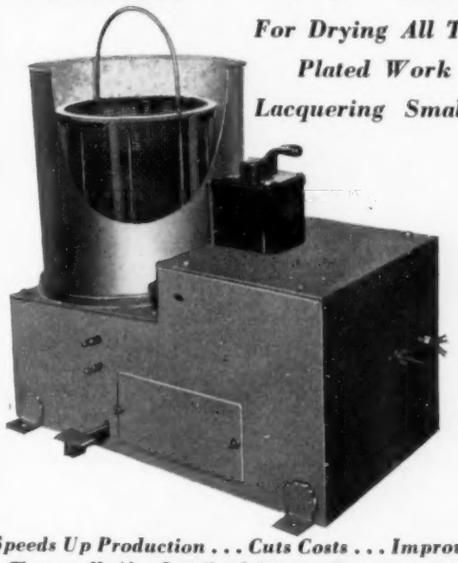
KREIDER *Centrifugal* **DRYER**

For Drying All Types of Plated Work and Lacquering Small Parts



Speeds Up Production . . . Cuts Costs . . . Improves Quality

The new Kreider Centrifugal Dryer reflects our many years' experience in this field. It is the result of our engineers effort to produce the best. Although unusually simple in design and easily operated by one man, the Kreider Dryer speeds up production and improves the quality of the work.

An auxiliary steam heating unit can be supplied as standard equipment when drying parts which have a tendency to retain water and additional steam is needed in the drying operation. Reversing drum switch is supplied on all dryers.

Write for Complete Specifications and Prices

DELLINGER MANUFACTURING CO.

727 North Prince St. Lancaster, Pa.

Jonathan Bartley

The death of *Jonathan Bartley* occurred on Monday, November 21st, 1938.

Mr. Bartley, who was the dean of the crucible and graphite industry was born in Bartley, N. J., November 12, 1850. He was the son of Hugh Bartley, and father and son were builders of flour mills, which dotted the country all through northern New

Jersey, some of these are still standing as a monument to the master hands that carved so true when milling was a real industry in this section. This was in his young manhood. Later in life he became interested in graphite and its products, and spent practically all of the remainder of his life in the development of the American crucible industry. He was probably the world's best authority on graphite and its products.

Mr. Bartley's first association with the graphite industry was with Joseph Dixon Crucible Co., Jersey City, N. J. This was in 1888, and in 1908 he organized the Jonathan Bartley Crucible Co., Trenton, N. J. During the war he built the Pettinos Brothers plant in Philadelphia, and the Chicago Crucible Company's plant in Chicago. He was president of the Bay State Crucible Company, and in 1924 he became vice-president of Asbury Graphite Mills, Asbury, N. J., establishing their new York office. In 1928 he retired, after a dynamic life of effort and accomplishment and his remaining years were spent in his little wood-working shop making many beautiful things. In his own words he termed it "an old man in his second childhood," but he spent many happy hours at his hobby.

Funeral services were held in Bloomfield, N. J., Thursday evening, November 24 and later at Long Valley in the Lutheran Church there.

Edwin S. Roach

Edwin S. Roach, 76, president of the Penn Brass and Copper Company, and treasurer of the Bury Compressor Company, died recently in Hamot Hospital, Erie, Pa., following a brief illness. His widow and two sons survive.

Mason B. Giberson, Sr.

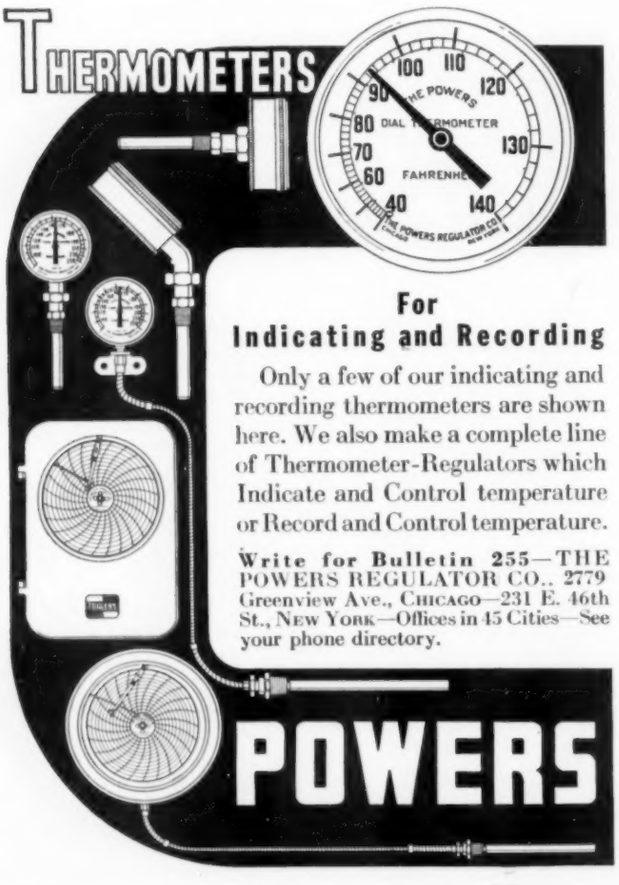
Mason B. Giberson, Sr., president of the National Foundry Sand Company, died in Detroit, October 24th. Mr. Giberson was born December 29, 1868 at Florence, N. J. Following an apprenticeship in N. J., he became a foundryman and served subsequently as an executive with various foundry companies. He went to Detroit 35 years ago and helped organize the company of which he was president. He was a member of the American Foundrymen's Association.

Stephen Abner Cochell

Stephen Abner Cochell passed away on October 26 on his 72nd birthday. Mr. Cochell was born in Monticello, Ind., went to Detroit fifty-nine years ago and in his later years was president of Cochell Wheel Polishing Company and the Michigan Gum Company. In his earlier years, he was foreman of the polishing department of the Michigan Stove Company and was one of the first organizers for the old Knights of Labor, an early workman's organization.

Gustaf A. Berg

Gustaf A. Berg, 44, Glyptal sales specialist in the appliance and merchandise department of the General Electric Company, Bridgeport, Conn., died suddenly from a heart attack on October 18 at his home in Monroe, Conn.



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"FINISHES TO FIT THE PRODUCT"

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Personals

Dr. Young Appointed Consultant for A. Robinson & Son

Dr. C. B. F. Young was born in Birmingham, Ala., May 13, 1908. His early education was completed in the city as well as his undergraduate studies, having finished Howard College in 1930, receiving his B.S. degree in chemical engineering. After graduating from this institution, he was appointed an assistant in the Dept. of Chemistry at Columbia University. He was later appointed assistant curator of the Chandler Chemical Museum at the same institution. He received from Columbia University his M.S. and Ph.D. degrees in the department of chemical engineering, working in the field of electrometallurgy.

Dr. C. B. F. YOUNG

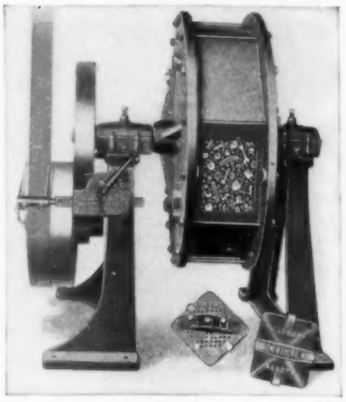
In 1934, he was appointed Technical Director of the U. S. Research Corp., L. I. City, N. Y., which position he held until he resigned to enter the consulting and teaching field. For the past four years he has given instruction at Columbia University. At present he is the President of the new Institute of Electrochemistry and Metallurgy, an instructor at Brooklyn Polytechnic Institute and a consultant.

Dr. Young is the author of the book, "Practical Electroplating" and has published some thirty papers dealing with electrochemistry, metallurgy and chemical engineering.

He is a member of the American Electrochemical Society, American Electroplaters' Society, American Society for the Advancement of Science and the following honorary societies: Sigma Xi, Epsilon Chi, Chi Alpha Sigma and Phi Lambda Upsilon.

D. J. MacNaughtan of the International Tin Research and Development Council is visiting in this country. Mr. MacNaughtan is noted for his many publications in the field of electrodeposition and particularly those referring to electrodeposition of tin and the structure and hardness of electrodeposited nickel.

Why Abbott Barrels Are Better



Ball burnishing depends on pressure for its efficiency. Abbott barrels confine the load within a narrow area . . . . bring maximum pressure to bear directly on parts being finished.
Such concentrated pressure is lacking in horizontal barrels in which the weight of the burnishing balls is scattered over a wide area.
Abbott barrels are the logical choice of companies demanding the most efficient equipment. There's a size to fit your production. Write for complete information. The Abbott Ball Company, 1046 New Britain Avenue, Hartford, Connecticut.

"better barrels — better burnishing"

Christmas Greetings!

AS another year draws to a close, we extend to you our best wishes for the Christmas season and for the New Year.

We are appreciative of your friendship and of the patronage you have given us. We pledge our best efforts to make MATCHLESS PRODUCTS and MATCHLESS SERVICE of even greater value to you.

As the New Year advances may it bring you an increasing measure of prosperity and happiness.

The Matchless Metal Polish Co.

840 W. 49th Pl., Chicago, Ill. 726 Bloomfield Ave., Glen Ridge, N. J.

TANTOL ELGAR FORMULA **No. 49**

PRODUCED UNDER U. S. PAT. NO. 1,777,121—TRADE MARK REG.

INDUCES A BRIGHTER DEPOSIT IN PRACTICALLY ANY PLATING SOLUTION

SAVES METAL—TIME—MATERIAL

16 Ounce Bottle **$3.50** Sufficient for 500 Gallons

10 c.c. Bottle **20c** PLUS 5c POSTAGE Ample for 5 Gallons

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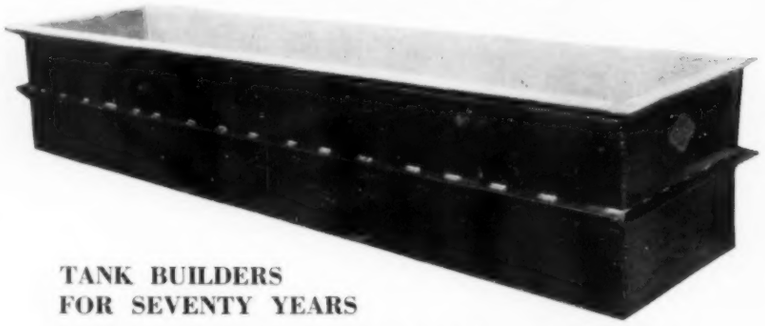

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ANNOUNCEMENT

The New York and Newark Branches

wish to announce concluding arrangements for the holding of a joint

Educational Session on the Afternoon of

Saturday, February 18th, 1939

To be followed by a BANQUET-DANCE and
SOCIAL HOUR in the evening
In the SALLE MODERNE and ROOF GARDEN of
THE HOTEL PENNSYLVANIA
7th Ave. & 33rd St., New York City

In resuming their Annual Technical Sessions and Banquets, New York Branch is happy to join with our Brother Branch of Newark in furthering the Educational and Social activities of the A. E. S. and hope to have the active interest and attendance of the Electroplating Fraternity and the Metal Finishing Industry.

Ralph J. Liguori, President
New York Branch

John Kotches, President
Newark Branch

Further details in forthcoming issues.

For information write F. J. Mac Stoker, Secretary
25 Princeton Street Garden City, N. Y.

C. A. Geatty has been appointed manager of metal sales for National Lead Co. Mr. Geatty was formerly manager of the Atlantic branch metal department. He succeeds *L. T. Wilson* who died suddenly on November 3rd.

Rolland C. Allen, Cleveland, Ohio, executive vice president of Oglebay, Norton & Co., has become a member of the board of trustees of Battelle Memorial Institute, industrial research organization of Columbus, Ohio, according to announcement by *Earle C. Derby*, newly elected president of the board. Mr. Allen's appointment, filling the vacancy created by the death of *Joseph H. Frantz*, late president of the board, brings to the research institution the services of an executive with wide experience in scientific, governmental and industrial organizations.

F. A. Abbiati was transferred on November 1st from the Merrimac Division of Monsanto Chemical Co., Everett Sta., Boston, Mass., to the Plastics Division at Indian Orchard, Mass., where he will have charge of the sales and sales development of continuous length cellulose acetate. Mr. Abbiati is known for his work in the organic finishing field as well as the application of inorganic chemicals to metal pickling.

Mr. Abbiati is a graduate of chemical engineering of the University of New Hampshire, where he starred on the football team for several years.

Charles Knupfer, who has been identified with the Carborundum Co., Niagara Falls, N. Y., since 1907, has been appointed vice president. He has been general sales manager since 1936. *Henry P. Kirchner*, who joined the company in 1919 and who has been works manager for the past 11 years, has also been appointed vice president.

Howard A. Acheson, President, Acheson Colloids Corp., returned from Europe last week. Mr. Acheson visited the company's British affiliate, E. G. Acheson, Ltd., in connection with the forthcoming introduction abroad of the new form of "dag" colloidal graphite.

Robert W. Hunt Company, engineers, 2200 Insurance Exchange, Chicago, Ill., announces the appointment of *Wilder A. Chapman* as Manager of Laboratories.

Mr. Chapman is a graduate of Tufts College with a B. S. in Chemistry and is a member of the following societies: American Society for Metals; American Chemical Society, including the Rubber Group; the Technical Association of the Pulp and Paper Industry, and of the Standards Committee of this association.

Following an earlier association with the Solvay Process Company, Mr. Chapman was connected with the Delaware, Lackawanna and Western R. R. for over six years. He joined Skinner and Sherman, Inc., of Boston in 1924 and was secretary, director and clerk of that corporation since 1930.

Verified Business Items

American Cyanamid & Chemical Corp., 30 Rockefeller Plaza, N. Y., has purchased from the Seaboard Air Line Railway a 72-acre tract of land at Georgetown, S. C., and from the Atlantic Coast Lumber Co., the buildings situated thereon. H. L. Derby, President of the corporation, has announced that construction and remodeling will begin at once and when completed will enable the corporation to give better service to the trade in the southeastern states. The first unit to be installed will be a plant for the production of sulphate of alumina, a product used for water purification and in the manufacture of paper.

H. Tom Collord has announced the formation of the *Paramount Rubber Service, Inc.*, 1430 Rosedale Ct., Detroit, Mich., whose service departments will include the Dip Dept., for the rubber-coating of metal units of every description; the S. R. L. Dept., home of the S. R. L. (seamless-rubber-lined) tanks; the Surfaseal Rubber Paints. *Collord, Inc.*, will feature high production of rubber parts for the motor car industry.

A. Robinson & Son, 131 Canal St., N. Y. City, prominent in the precious metals industry for sixty years, has appointed *Dr. C. B. F. Young*, chemical engineer, as chief research director and consultant. Dr. Young will assist in the development and sales of A. Robinson & Son's assayed gold plating solution, which has been met with increasing interest by the industry.

Harry J. Blank, president of Zophar Mills, Inc., Brooklyn, N. Y., established in 1846, manufacturers of wax and resinous compounds announces the addition of a Chemical Specialties Division under the supervision of *S. M. Hendrickson*. A full line of industrial cleaning and drawing compounds will be manufactured.

Pioneer Engineering & Mfg. Co., Detroit, Mich., manufacturer of coolant and lubricant pumps, announces the appointment of Harris Pump and Supply Company, Pittsburgh, Pa., as representative for its products. Departments: stamping, grinding, enameling. Principal base metals used: steel, bronze.

Bartlett-Thompson Co., metal specialties manufacturer formerly located in Winchester, Mass., has moved to 24 Water St., Wakefield, Mass., because of its Winchester plant being wrecked by the hurricane. Departments: spinning, soldering, brazing, welding, cleaning, lacquering. Principal base metals used: brass, steel, bronze, nickel silver, aluminum.

Raybestos-Manhattan Co., 1427 Railroad Ave., Bridgeport, Conn., has awarded contract for the construction of a plant including office building, shipping room, laboratory and garage, also storage unit at Stratford, Conn. Estimated cost $40,000. Departments: brazing, welding, grinding, finishing.

Eastman Kodak Co., Rochester, N. Y., has let general contract for six-story and basement addition to main camera works on Plymouth Avenue, 250 x 300 ft. Cost over $550,000 with equipment. Departments: drawing, extruding, pickling, spinning, stamping, soldering, brazing, welding, grinding, sand blasting, descaling, polishing, degreasing, cleaning, plating, tumbling, burnishing, buffing, coloring, anodic treatment, lacquering, enameling, finishing. Principal base metals used: brass, steel, bronze, nickel silver, aluminum.

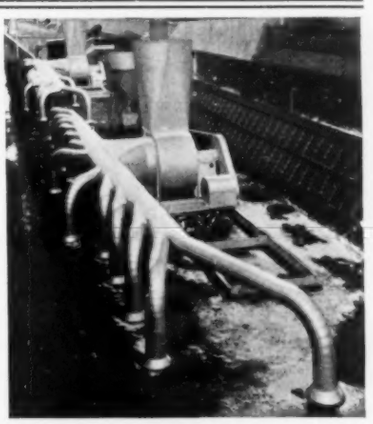
Sunbeam Electric Mfg. Company, Evansville, Ind., manufacturers of Coldspot refrigerator units, portions of the Coldspot refrigerator cabinets and the Sunbeam headlights and generators for locomotives, has let general contract for one-story addition, 125 x 150 ft. for storage and distribution. Cost over $50,000 with equipment. Departments: pickling, stamping, welding, grinding, sand blasting, degreasing, cleaning, plating, enameling, tinning. Principal base metals used: brass, steel.

KIRK & BLUM SYSTEMS

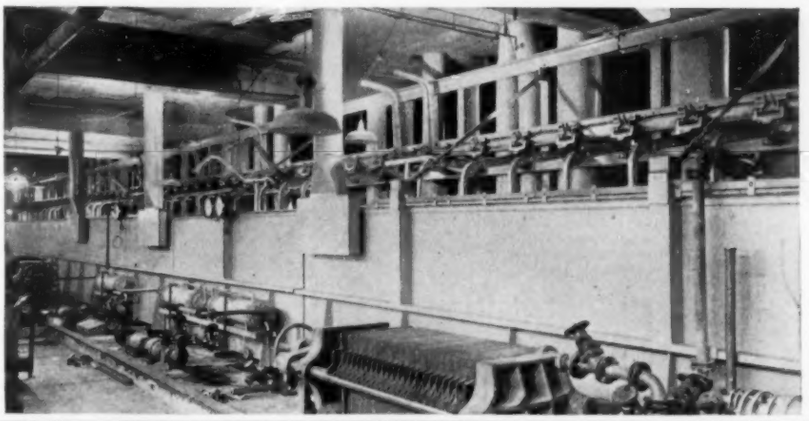
protect Men and Machines . . .

FUMES and vapors, from metal parts cleaning, pickling and plating operations are injurious to men and machines. Kirk & Blum Fume Exhaust Systems are designed and built to remove these fumes with utmost efficiency and economy. That is why they are extensively used in plating shops of all sizes as well as in the plating departments of many leading manufacturing plants.

If you have a fume removal, dust collecting, pickling or plating problem, K & B Engineers will make a thorough survey of your plant and submit recommendations to solve it to your complete satisfaction. Write for details of this service—Send for new Catalog.



Illustrated below is a large Kirk & Blum installation on a Stevens automatic cleaning and pickling machine in the plant of a leading manufacturer of electric refrigerators. The suction piping connections and header exhaust fans and discharge stacks on factory roof are shown at right.



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Designers and Builders of Dust Collecting, Fume Exhaust, Ventilating Systems—Industrial Ovens—Pickling and Plating Equipment, etc.

Chicago Representative: C. P. Guion, 1661 North Milwaukee Avenue. Pittsburgh: The Bushnell Machinery Company, 311 Ross Street. Louisville: Liberty Eng. & Mfg. Co., Inc., 1450 So. 15th Street

STAINLESS STEEL

CHROME

Many Thanks!

A Very Merry Xmas

and

A Most Prosperous New Year

We Appreciated Your Patronage During The Past Year. We Look Forward To Continued Pleasant Relations And To A Most Successful 1939 With The Sincere Hope That Things Will Be Better Than Ever.

THE BUCKEYE PRODUCTS CO.

Cincinnati, Ohio

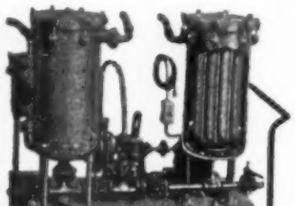
Manufacturers of

SPEEDIE BUFFING & POLISHING COMPOSITIONS

TRIPOLI

LIME FINISH

PRESSURE FILTERS—for . . . . PLATING SOLUTIONS CLEANERS, NEUTRALIZING SOLUTION, DEGREASING SOLVENTS, ETC.



Cut illustrates closed & internal view of filter.

INDUSTRIAL FILTERS OFFER—
PERFECT CLARITY AT RATED CAPACITIES—*Guaranteed*

CLOSED FILTRATION—Filter plates locked in leak proof chamber, which means "no leaking"—"no lost solution."

LARGE FILTER CHAMBER—Affords greater sludge holding capacity making ideal system for removal of carbon or lime from treated solutions in process of eliminating iron, organic matter, oil, etc.

Write for literature including specifications on filters for HOT & BRITE NICKEL, BRITE ZINC, CHROMIUM & ELECTROCOLOR.

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This name in your plating room assures you of a perfect adhesion in your plating cycle.

CLEPO—the ultimate in cleaning efficiency.

CLEPO heads the specification list of many of the nation's largest manufacturers.

Our Laboratory's spectacular new developments are adding new customers daily to our long list of satisfied users.

Drop a line if you have any plating problem and we will have one of our experts call upon you.

FREDERICK GUMM CHEMICAL CO., Inc.
538 Forest St., Kearny, N. J.

The *Claude B. Schneible Company*, 3951 Lawrence Avenue, Chicago, Ill., manufacturers of Multi-Wash Dust Collecting Equipment, have made the following appointments:

O. W. Anderson, Los Angeles representative for Southern California; Robert M. Taylor Company, San Francisco for Northern California; King Machinery Co., Cambridge, Mass., will represent Schneible in the New England States; *R. F. Skarnes*, Minneapolis, has taken over the North Central territory; and *Guy H. Rumpf* will now handle the St. Louis territory.

L. C. Beers, formerly sales representative in the New England States has been transferred to the Chicago office to fill the capacity of Assistant Sales Manager.

Two-day technical sales conferences are currently being held by various service divisions of *Oakite Products, Inc.* The essential purpose of these conferences is to keep users of Oakite materials acquainted with new developments and improvements in methods and materials that apply to their processing or plant maintenance cleaning operations.

Under the direction of Division Manager *J. C. Leonard*, the Chicago Division convened at the Hotel Statler in St. Louis, Nov. 18-19. The Detroit Division headed by *H. C. Duggan*, gathered at the Hotel Statler in Detroit, Nov. 21-22. The Northeastern Division meets at the Commodore Hotel in New York, Dec. 2-3, with Division Manager *D. X. Clarin* in charge. The Philadelphia Division, of which *J. J. Basch* is manager, is scheduled to hold their meeting at the Hotel Pennsylvania, New York, Dec. 9-10. In addition to the 90 Oakite representatives, the conferences are being also attended by *J. A. Carter*, *H. L. Gray*, Assistant Managers, and *E. C. Rinker* and *Wm. A. Allison* of the Oakite Technical Research Department. Date of the West Coast Division Conference will be announced later.

Subjects discussed include cleaning before bright nickel and chrome plating; removal of sludge, grease, oil deposits and other accumulations from Diesel crank cases and inside surfaces of gasoline and Diesel engines with a cold cleaning solution; and cleaning and anti-rusting metal parts between various fabricating operations.

Herbert J. Winn, retiring President of the 87-year-old *Taylor Instrument Companies*, becomes Chairman of the Board of Directors and is succeded in the presidency by *Lewis B. Swift* who has served as vice-president in charge of Engineering and Research. *Karl H. Hubbard* has been appointed Chief Engineer, in charge of Engineering Research and Design and *Dr. H. L. Mason* will succeed him as head of the Research Division. Official announcement was made November 9th.

Mr. Swift joined the Taylor Instrument Companies in 1904 after graduation from high school. In 1908 he entered Cornell University, but continued to work for Taylor during vacations. After receiving his M. E. degree in 1912, he rejoined the Company on a full time basis. He was in the Industrial Sales Department until 1919 when

he organized and took charge of the Sales Engineering Department.

In 1928 Mr. Swift was elected a director of the Company, and in 1929 he became Chief Engineer. Since 1934 he has been vice-president in charge of Engineering Research and Design.

Mr. Winn, retiring president, has been with Taylor nearly 46 years, and has served as president and treasurer for 25 years. When he joined the Company in March 1893, the Taylor line was composed of only household thermometers, clinical thermometers, and mercurial barometers; and the combined office and plant forces did not exceed 60 employees.

Mr. Winn will maintain an active interest in Taylor's, as well as in his numerous financial and philanthropic activities.

Other officers chosen by the board of directors include: vice-presidents, *P. Richard Jameson, Henry W. Kimmel,* and *Fred K. Taylor;* treasurer, *Herbert J. Noble;* secretary, *Henry W. Kimmel;* assistant secretary, *George H. Taylor.*

At the annual meeting of the *Meehanite Research Institute* held in Rochester, N. Y. the week of October 24, *O. Smalley,* president of the Meehanite Metal Corporation, Pittsburgh, Pa., was re-elected President; *H. B. Hanley,* Foundry Manager of the American Laundry Machinery Company, Rochester, N. Y., Vice President; and *F. M. Robbins,* President of Ross-Meehan Foundries, Chattanooga, Tenn., Secretary-Treasurer. Research and advertising activities are to receive special emphasis under the supervision of *A. C. Denison,* President of Fulton Foundry & Machine Company, Cleveland, Ohio, as chairman of Research Committee and *Peter E. Rentschler,* President of Hamilton Foundry & Machine Company, Hamilton, Ohio, as Chairman of the Advertising Committee.

Some 46 research papers were presented on a variety of subjects, including "The Physics of Machining" by *Hans Ernst* of the Cincinnati Milling Machine Company.

Over 65 representatives of the Meehanite licensees throughout this country, Canada, and South Africa attended the meetings and discussions.

Three new appointments at *Gary Works of Carnegie-Illinois Steel Corporation* were announced today. Those appointed were *Robert A. Peterson* as superintendent of the salvage department, *J. Donald Rollins* as assistant chief estimator in the engineering department, and *Robert E. Dittrich* as assistant to division superintendent of coke plant and blast furnaces.

Mr. Peterson first started with United States Steel corporation subsidiaries in 1934 as rolling mill advisor for the American Steel and Wire company after four years as manager of heavy mill sales for Aetna Standard Engineering company and ten years as superintendent of erection for Morgan Construction Company. In 1936 he joined the Gary Works organization as assistant superintendent of the merchant, wheel and axle mills and a year later he was made superintendent of the merchant

STANLEY

WRINKLE FINISHES

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IN our 70F-1 FINE BLACK and 70F-2 COARSE BLACK WRINKLE FINISHES we offer two materials of the very highest quality. A high gloss and jet-blackness of color are now possible with these materials.

To insure uniform results they are shipped ready for use. They are intended for spray application without reduction and should be baked for two hours at 250°F. They are unaffected by air drying for a reasonable time before baking.

They produce, in a single coat, an extremely attractive and economical finish having good hardness and adhesion.

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Lacquers • *Synthetics* • *Enamels* • *Japans*

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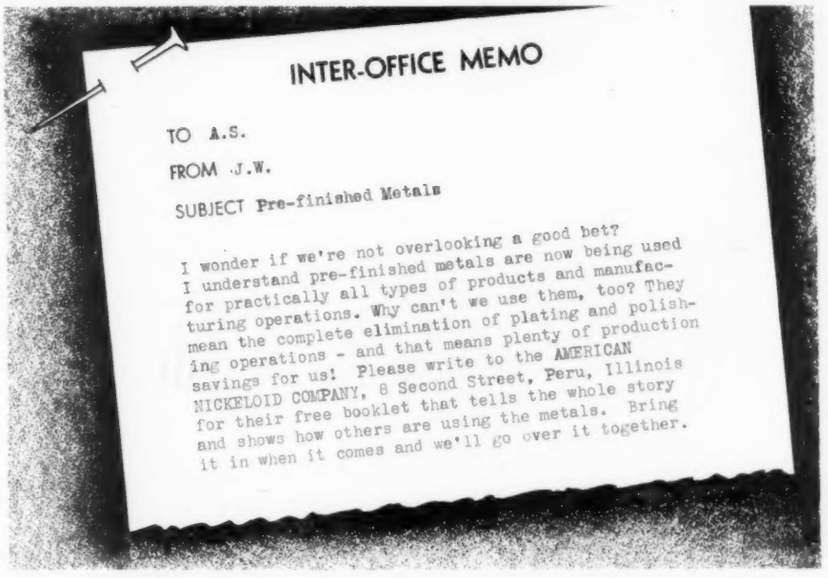
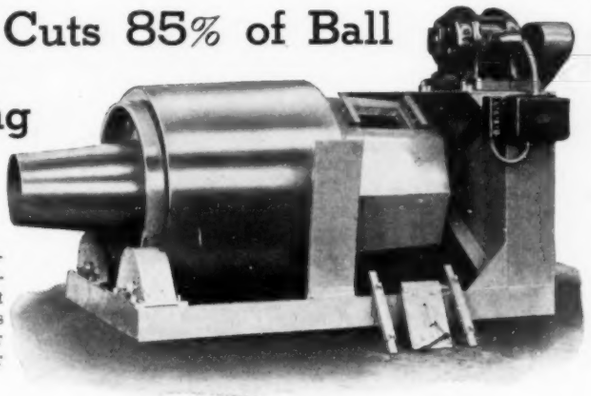

INTER-OFFICE MEMO
TO A.S.
FROM J.W.
SUBJECT Pre-finished Metals
I wonder if we're not overlooking a good bet? I understand pre-finished metals are now being used for practically all types of products and manufacturing operations. Why can't we use them, too? They mean the complete elimination of plating and polishing operations - and that means plenty of production savings for us! Please write to the AMERICAN NICKELOID COMPANY, 8 Second Street, Peru, Illinois for their free booklet that tells the whole story and shows how others are using the metals. Bring it in when it comes and we'll go over it together.

IDEAL

TRADE MARK REG. U.S. PAT OFF.

Cuts 85% of Ball Burnishing Labor Cost

This barrel accommodates more burnishing material, handles it automatically, produces better finish, larger production, at lower cost.



Side-loading, end-discharge IDEAL Burnishing Barrel

Put it up to Specialists

N. Ransohoff Inc.

West 71st St. at Millcreek, Carthage, Cincinnati, O.

We also manufacture drying, sawdust tumbling, plating, separating and pickling machinery.

bar mill, the position he held until the present time.

Mr. Rollins has been associated with United States Steel corporation subsidiaries since 1934 when he was employed as a junior draftsman and estimator by the American Sheet and Tin Plate company at Pittsburgh. Coming to Carnegie-Illinois in 1936, he was employed as an estimator for approximately a year in the Pittsburgh office until his transfer to Gary Works in the same capacity. He held this position until his recent appointment. Before his service with the Corporation he had been employed in refrigeration service.

Mr. Dittrich began work as a clerk in the industrial relations department at Gary Works in 1930 and remained in that capacity until his present promotion.

The *Edward G. Budd Manufacturing Company*, builders of lightweight rail equipment of stainless steel, announced today it had received an order for a seven-car "daylight" type train from the Seaboard Airline Railway.

The train will consist of all-chair equipment, with observation and lounge facilities, and will be powered by a 2,000 horespower diesel-electric locomotive built by Electro-Motive Corporation.

The new streamliner will be placed in service on the New York-Florida run probably in early February according to L. R. Powell, Jr., receiver.

The *Edward G. Budd Manufacturing Company*, builders of lightweight transportation equipment of stainless steel, announced it had received an order for 250 each of rudders, stabilizers, elevators and fuel tanks from the Piper Aircraft corporation, Lock Haven, Pa. The parts will be used in the new model J-4 Piper Plane.

Engineers stated that the use of stainless steel in this type of construction would reduce materially the weight of aircraft structures, and would also resist salt water and spray action.

Fabrication of the parts will be by the exclusive "SHOTWELD" process.

New Glass Textile Announced

Owens-Illinois Glass Company and Corning Glass Works, producers of glass, announce the formation of the Owens-Corning Fiberglas Corporation with principal offices in Toledo, Ohio, and the New York office at 718 Fifth Avenue. Other sales offices will be located in Boston, Washington, Chicago, Detroit, Pittsburgh, Cincinnati and San Francisco. They will produce a variety of products made from fiber glass. The result of the extensive research facilities of these two companies, the products to be manufactured by the new corporation are said to promise revolutionary developments in many fields of insulation, construction and industrial design. The announcement on November 2 was made jointly by Amory Houghton, chairman of the board of the new company, and Harold Boeschenstein, president. It marked the culmination of development work by the two companies involving expenditures totalling about $5,000,000.

Forecasting far-reaching effects of the new developments in such fields as household equipment, construction, electrical power and refrigeration insulation, Mr. Boeschenstein said that these entirely new applications of glass to fields previously dominated by organic textiles and other materials are well out of the experimental stage in many phases. The utilization of glass includes insulation of stoves, refrigerators, homes, with fiber glass for winter protection of plants and shrubs. Fiber glass separator plates have also been developed which are claimed to substantially increase the power from batteries. Fiber glass is also suggested for use in air filters for heating, air conditioning and other electrical insulation, as well as insulation of electro-magnetic devices.

Manhattan Rubber Observes 45th Anniversary

The forty-fifth anniversary of the founding and incorporation of The Manhattan Rubber Mfg. Company, now the Manhattan Rubber Mfg. Division of Raybestos-Manhattan, Inc., Passaic, N. J., was observed on October 28th. Manhattan Rubber is one of the leaders of the manufacture of rubber products, such as bicycle tires, matting, molded goods, etc., and now employs approximately 3,000 persons in a plant that covers 800,000 sq. ft. of floor space. Auxiliary plants have been established at Whippany, N. J., Neenah, Wisc., and North Charleston, S. C.

Aluminum Association

The Golden Anniversary of the aluminum industry was marked at a meeting on November 10, in New York City, at which a testimonial dinner was given, with *Arthur Vining Davis*, chairman of the Aluminum Company of America, as guest of honor. Speakers included *Capt. Kenneth G. Castlemen*, secretary of the Aluminum Association as well as leaders in aviation, transportation, household appliances and other fields of manufacture.

Machine and Tool Show

Details of the second annual *Machine and Tool Progress Exhibition*, to be held in Detroit March 14-18, have been announced by *Frank A. Shuler*, Chrysler Corp., and Chairman of the Show Committee.

As previously announced, the show will be held in Convention Hall, Detroit, the locale of last year's exhibition. According to

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Sets for Chromium, Nickel, Copper, Brass, etc.
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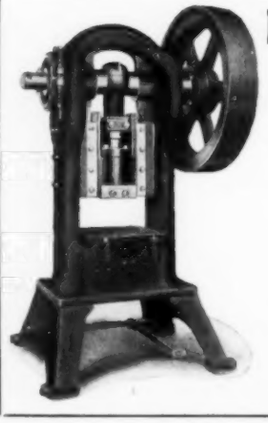
Pioneers in Testing Sets for Platers



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Borolon TRADE MARK ABRASIVE POLISHING GRAIN
Strictly first quality aluminum oxide abrasive grain manufactured in our own electric furnace plant. Specially prepared and treated for most efficient polishing performance. Write for samples.
ABRASIVE COMPANY GRINDING WHEEL AND ABRASIVE DIVISION OF SIMONDS SAW AND STEEL CO. PHILADELPHIA, PA.

reservations already being received at the headquarters' offices of the American Society of Tool Engineers, sponsors of the show.

American Zinc Institute

Unusually large attendance and great interest in technical problems relating to the galvanizing industry marked the Fall meeting of The Galvanizers Committee which was held at Chicago, November 17-19, under the sponsorship of the American Zinc Institute.

More than sixty representatives from nineteen steel companies, including two Canadian producers of galvanized sheets, attended the general sessions and participated in the inspection trips to the mills of Carnegie-Illinois Steel Corporation at Gary, Indiana, and the Inland Steel Company at Indiana Harbor.

At each general session a formal paper of general technical interest was presented, after which followed informal round-table discussions of practical operating problems brought up by individual members of the Committee.

F. G. White, Granite City Steel Company, was re-elected Chairman of the Governing Board, other members of which are: *G. A. Brayton*, Newport Rolling Mill Company; *N. E. Cook*, Wheeling Steel Corporation; *R. H. Dibble*, Carnegie-Illinois Steel Corporation; *B. P. Finkbone*, American Rolling Mill Company; *D. A. Russell*, Youngstown Sheet and Tube Company, and *J. L. Schueler*, Continental Steel Corporation.

Metal Market Review

November 28, 1938.

Copper prices remained steady throughout the month at 11¼c. During the month, buying for both Russia and Japan made its appearance which strengthened the price structure abroad as well as here. Consumption of copper by the wire mills also increased. The weekly sales of copper were: October 27, 5,720 tons; November 3rd, 2,860; November 10th, 4,659; November 17th, 1,217.

The announcement on November 23rd that the foreign group would increase production to 110% of the basic tonnages effective January 1st, 1939, strengthened the London Market and brought in some good buying.

The *zinc* situation throughout the month remained in an inactive state until the industry was stunned by the knowledge of the tariff reduction on zinc effective January 1st, 1939. As soon as the domestic zinc industry got its bearings, the price was dropped on November 21st from 5.05c St. Louis basis for Prime Western to 4.75c. Domestic producers were badly shaken by the reduction in the tariff since they have been operating on a curtailed basis for many months to improve the statistical position of the market.

Cadmium prices remained at 65c per pound commercial sticks wholesale quantities until November 22nd when the price dropped to 60c. This lowering of price was induced by the announcement of the tariff reduction on cadmium from 15c to 7½c. Although Ford is still using cadmium bearings, the recent depression has caused a surplus of cadmium in the hands of producers.

Lead sales remained quiet throughout the month and the price was firm at 5.10c New York. Weekly sales for the month were: October 27, 7,193 tons; November 3rd, 4,660; November 10th, 4,710 and November 17th, 2,058.

Tin remained quiet the first part of the month but the announcement of a reduction of $7.00 per ton for tinplate effective November 10th resulted in the market for tin becoming fairly active with prices strengthening in spite of unsettled prices abroad in the other metals. The tin prices throughout the month varied from a high of 46.850c on November 12th to a low of 45.925c on November 22nd. The International Tin Committee met in Paris on November 22nd and voted to continue production of tin at 45% of standard tonnages.

Silver remained at 42¾c per Troy oz., New York. During the week of November 24th, however, the silver price in London rose from 19⅞d. on November 17th to 20⅛d. on November 23rd, principally caused by the decline in Sterling.

BOGUE
QUALITY DYNAMOS
COMPLETE GENERATOR SETS

6-12 Volts—Sizes to 15000 Amps. Special Voltages to Order

NEW SETS—EFFICIENT—DURABLE

REPAIRS—BRUSHES—ALL MAKES

BOGUE ELECTRIC CO.
WEST PATERSON, N. J.
Mfrs. over 46 years
Strictly Quality Generators, Also Rebuilt Sets

pH PAPERS

FOR DETERMINING pH VALUES OF ACID OR ALKALINE SOLUTIONS

SIMPLE—CONVENIENT—DEPENDABLE—QUICK—NO APPARATUS—RESULT IN FEW SECONDS

Just dip strip of pH paper in solution and read off pH value. Can be carried in pocket. Always handy.

PAUL FRANK
456 Fourth Ave. New York
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PERMAG Cleaning Compounds

—helped a light fixture manufacturer out of a serious difficulty

He could not produce a satisfactory finish on the fixtures. Everything failed. Heavy losses threatened. Finally Magnuson experts were called in; their thorough investigation soon found the difficulty. Proper buffing compounds replaced wrong ones. PERMAG was used for cleaning, and the finish on the fixtures turned out perfectly. This is only one of hundreds of instances where Magnuson Service+PERMAG solved the problem.

MAGNUSON PRODUCTS CORPORATION
Main Office and Factory, Third & Hoyt Sts., Brooklyn, N. Y.

28 years' experience manufacturing, selling and servicing Specialized Industrial Cleaning Compounds for every purpose.
Representatives, also Warehouses in Principal Cities of U. S. from Coast to Coast
Canadian Branch: Canadian Permag Products Ltd., Ottawa & Queen Sts. Montreal, P. Q. Cable Address PERMAG, N. Y.

Supply Prices, November 29, 1938

Anodes

Prices, except silver, are per lb. f.o.b., shipping point, based on purchases of 2,000 lbs. or more, and subject to changes due to fluctuating metal markets.

COPPER: Cast	20⅞c. per lb.	NICKEL: 90-92%, 16" and over	.45 per lb.
Electrolytic, full size, 15⅞c.; cut to size	15⅞c. per lb.	95-97%, 16" " "	.46 per lb.
Rolled oval, straight, 16⅜c.; curved	17⅜c. per lb.	99%+cast, 16" and over, 47c.; rolled, depolarized, 16" and over, 48c.	
BRASS: Cast	19½c. per lb.	SILVER: Rolled silver anodes .999 fine were quoted Oct. 31, from 46c. per Troy ounce upward, depending on quantity.	
ZINC: Cast	10¼c. per lb.		

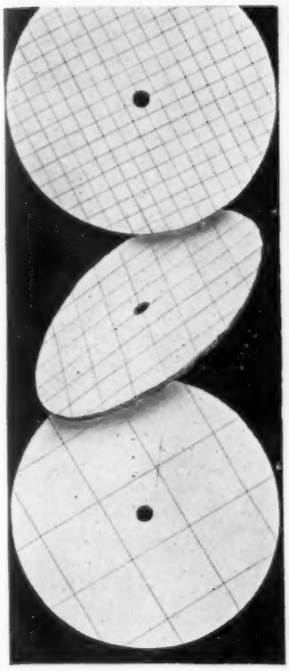
Chemicals

These are manufacturers' quantity prices and based on delivery from New York City.

Acetone, C.P. l.c.l., drums	lb.	.06¼
Acid, Boric (boracic) granular, 99.5%, bbls.	lb.	.053-.059
Chromic, 99%, 100 lb. and 300 lb. drums	lb.	.16¾-.17¼
Hydrochloric (muriatic) Tech., 20°, carboys	lb.	.027
Hydrochloric, C.P., 20°, carboys	lb.	.08
Hydrofluoric, 30%, bbls.	lb.	.07-.08
Nitric, 36°, carboys	lb.	.06
Nitric, 42°, carboys	lb.	.075
Oleic (Red Oil), distilled, drums	lb.	.08⅜
Oxalic, bbls. l.c.l.	lb.	.12-.14
Stearic, double pressed, distilled, bags	lb.	.105-.115
single pressed, bags	lb.	.10-.11
triple pressed bags	lb.	.135-.145
Sulphuric, 66°, carboys	lb.	.025
Alcohol, Amyl, l.c.l., drums	lb.	.14
Butyl-normal, l.c.l., drums	lb.	.10
Denatured, S.D. No. 1, 190 pf., bbls., works	gal.	.36
Diacetone, pure, drums, l.c.l.	lb.	.12
Methyl, (Methanol), 95%, drums, l.c.l.	gal.	.385-.405
Propyl-Iso, 99%, l.c.l., drums	gal.	.41
Propyl-Normal, drums	gal.	.70
Alum, ammonia, granular, bbls., works	lb.	.032
Potash, granular, bbls., works	lb.	.034-.037
Ammonia, aqua, 26°, drums, carboys	lb.	.025-.05¼
Ammonium, chloride (sal-ammoniac), white, granular, bbls.	lb.	.05-.075
Sulphate, tech., bbls.	lb.	.035-.05
Sulphocyanide (thiocyanate), pure, crystal, kegs	lb.	.55-.58
Sulphocyanide (thiocyanate), com'l, drums	lb.	.16
Antimony Chloride (butter of antimony), sol., carboys	lb.	.13-.153
Barium Carbonate, ppted., l.c.l., bags, works	lb.	.029
Benzene (Benzol), pure, drums	gal.	.21
Butyl Lactate, drums	lb.	.225
Cadmium Oxide, l.c.l., bbls	lb.	.95
Calcium Carbonate (Ppted. chalk), U.S.P.	lb.	.05¾-.075
Carbon Bisulfide, l.c.l., 55 gal. drums	lb.	.05¾-.06
Carbon Tetrachloride, l.c.l., drums	lb.	.055
Chrome, green, commercial, bbls.	lb.	.22
Chromic Sulphate, drums	lb.	.26¼
Cobalt Sulphate, drums	lb.	.59
*Copper, Acetate (verdigris), bbls.	lb.	.25
Carbonate, 53/55%, bbls.	lb.	.155
Cyanide, Tech., 100 lb. bbls.	lb.	.34
Sulphate, Tech., crystals, bbls.	lb.	.05
Cream of Tartar (potassium bitartrate), crystals, kegs	lb.	.20¼
Crocus Martis (iron oxide) red, tech., kegs	lb.	.07
Dibutyl Phthalate, l.c.l., drums	lb.	.195
Diethylene Glycol, l.c.l., drums, works	lb.	.17
Dextrine, yellow, kegs	lb.	.05-.08
Emery Flour (Turkish)	lb.	.07
Ethyl Acetate, 85%, l.c.l., drums	lb.	.066
Ethylene Glycol, l.c.l., drums, works	lb.	.17-.20
Flint, powdered	ton	30.00
Fluorspar No. 1 ground, 95-98%, mines	ton	$40.00
Fusel Oil, refined, drums	lb.	.125-.14
*Gold, Chloride	oz.	$18¼-23
Cyanide, potassium 41%	oz.	$15.45
Cyanide, sodium 46%	oz.	$17.10
Gum, Arabic, white, powder, bbls.	lb.	.125-.14
Sandarac, prime, bags	lb.	.50
Hydrogen Peroxide, 100 volume, carboys	lb.	.20
Iron Sulphate (Copperas), bbls.	lb.	.016
Lead, Acetate (Sugar of Lead), bbls.	lb.	.10-.12¾
Oxide (Litharge), bbls.	lb.	.125
Magnesium Sulphate (Epsom Salts), tech., bag	lb.	.018
Mercury Bichloride (Corrosive Sublimate)	lb.	$1.58
Mercuric Oxide, red, powder, drums	lb.	$1.51
Nickel, Carbonate, dry, bbls.	lb.	.36-.41
Chloride, bbls.	lb.	.18-.22
Salts, single, 425 lb. bbls.	lb.	.135-.145
Salts, double, 425 lb. bbls.	lb.	.135-.145
Paraffin	lb.	.05-.06
Phosphorus, red	lb.	.40-.44
yellow	lb.	.24-.30
Potash, Caustic, 88-92%, flake, drums, works	lb.	.07¼-.075
Potassium, Bichromate, crystals, casks	lb.	.09¼
Carbonate (potash) 98-100%, drums	lb.	.06¾
Cyanide, 94-96%, cases	lb.	.525
Pumice, ground, bbls.	lb.	.03
Quartz, powdered	ton	$30.00
Quicksilver (Mercury) 76 lb. flasks	flask	$74.-$76.50
Rochelle Salts, crystals, bbls.	lb.	.17¼
Rosin, gum, bbls.	lb.	5.25-7.75
*Silver, Chloride, dry, 100 oz. lots	oz.	.40¼
Cyanide, 100 oz. lots	oz.	.39⅝
Nitrate, 100 oz. lots	oz.	.35
Sodium, Carbonate (soda ash), 58%, bbls.	lb.	.0235
Cyanide 96%, 100 lb. drums	lb.	.15
Hydroxide (caustic soda) 76%, flake	lb.	.04
Hyposulphite, crystals, bbls.	lb.	.035-.065
Metasilicate, granular, bbls.	lb.	.0315
Nitrate, tech., bbls.	lb.	.029
Phosphate, tribasic, tech., bbls.	lb.	.03
Pyrophosphate, anhydrous, bbls., l.c.l.	lb.	.063
Sesquisilicate, drums	lb.	.0405
*Stannate, drums	lb.	.31-.34
Sulphate (Glauber's Salts), crystals, bbls., works	lb.	.0135
Sulphocyanide, drums	lb.	.30-.35
Sulphur, Flowers, bbls., works	lb.	.027-.0410
*Tin Chloride, 100 lb. kegs	lb.	.37
Toluene (Toluol), pure, drums, works	gal.	.27
Tripoli, powdered	lb.	.03
Wax, Bees, white, bleached, slabs 500 lbs.	lb.	.36-.37
Bees, yellow, crude	lb.	.21-.215
Carnauba, refined, bags	lb.	.365
Montan, bags	lb.	.115-.118
Spermaceti, blocks	lb.	.23-.24
Whiting, Bolted	lb.	.025-.06
Xylene (Xylol), drums, works	gal.	.31
Zinc, carbonate, bbls.	lb.	.14-.15
Cyanide, 100 lb. kegs	lb.	.33
Chloride, granular, drums	lb.	.065
Sulphate, crystals, bbls.	lb.	.04

*Subject to fluctuations in metal prices.

Metal Prices on page 600.



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(Special) A large organization reports the use of Metso Cleaner for cleaning zinc base, die cast materials for nickel plating.

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Those having problems in cleaning die castings may consult the Cleaner Division of the Philadelphia Quartz Company, manufacturers of Metso Cleaners.

METSO CLEANERS

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General Offices and Laboratory: 125 S. Third St., Phila., Pa.
Chicago Sales Office: 205 W. Wacker Drive. Stocks in 60 cities.
Sold in Canada by NATIONAL SILICATES LTD., Toronto, Ont.

Besplate

NICKEL ANODES

ARE QUALITY PRODUCTS . . .

LEADERS in the Nickel Plating Industry have standardized on McGean Besplate 99% Nickel Anodes — Because

1. Cathode Deposits are smoother
2. Anode corrosion is excellent
3. Less frequent filtering of solution required

◆◆◆◆◆

We Also Offer

Genuine Rolled Oval Depolarized Nickel Anodes

◆◆◆◆◆

From our complete line of Anodes and Plating Chemicals we call your attention to the following.

ANODES

Nickel (all percentages)	Tin
Copper	Brass
Cadmium	Zinc

CHEMICALS

Nickel Salts	Copper Sulphate
Nickel Chloride	Copper Cyanide
Nickel Carbonate	Copper Carbonate
Chromic Acid	Cadmium Oxide

Manufactured by

THE McGEAN CHEMICAL COMPANY
CLEVELAND, OHIO

McGEAN CHEMICALS

Metal Prices, November 29, 1938

(Import duties and taxes under U. S. Tariff Act of 1930, and Revenue Act of 1932)

New Metals

COPPER: Lake, 11.375, Electrolytic, 11.25, Casting, 10.775.
ZINC: Prime Western, 4.50. Brass Special, 4.60.
TIN: Straits, 45.85. LEAD: 4.85.
ALUMINUM: 20. ANTIMONY, Ch. 14.00.
NICKEL: Shot, 36. Elec., 35.
QUICKSILVER: Flasks, 75 lbs., $77.00. BISMUTH, $1.05.
CADMIUM, .60. SILVER, Troy oz., official pr., N. Y., Nov. 29, 42¾c.
GOLD: Oz. Troy, Official U. S. Treasury price $35.00.
SCRAP GOLD, 6¾c. per pennyweight per karat, dealers' quotation.
PLATINUM, oz. Troy $31-34.

Duties: Copper, 4c. lb.; zinc, 1½c. lb.; tin, free; lead, 2½c. lb.; aluminum, 4c. lb.; antimony, 2c. lb.; nickel, 3c. lb.; quicksilver, 25c. lb.; bismuth, 7½%; cadmium, 15c. lb.; cobalt, free; silver, free; gold, free; platinum, free.

Ingot Metals and Alloys

	Cents lb.	U. S. Import Duty	Tax*
No. 1 Yellow Brass	9.125	None	4c. lb.[1]
85-5-5-5	11.25	None	4c. lb.[1]
88-10-2	14.75	None	4c. lb.[1]
80-10-10	13.125	None	4c. lb.[1]
Manganese Bronze (60,000 t. s. min.)	11.125	None	4c. lb.[1]
Aluminum Bronze	15.375	None	4c. lb.[1]
Monel Metal Shot or Block	28	25% a. v.	None
Nickel Silver (12% Ni)	13.125	20% a. v.	4c. lb.[1]
Nickel Silver (15% Ni)	15.375	20% a. v	4c. lb.[1]
No. 12 Aluminum	13.50-15.25	4c. lb.	None
Manganese Copper, Grade A (30%)	22-27	25% a. v.	3c. lb.[1]
Phosphor Copper, 10%	15.00	3c. lb.	4c. lb.[1]
Phosphor Copper, 15%	15.50	3c. lb.	4c. lb.[1]
Silicon Copper, 10%	21.50	45% a. v.	4c. lb.[1]
Phosphor Tin, no guarantee	50-60	None	None
Iridium Platinum, 5% (Nominal)	$38.50	None	None
Iridium Platinum, 10% (Nominal)	$40.00	None	None

*** Duty is under U. S. Tariff Act of 1930; tax under Section 80 (7) of Revenue Act of 1932.**
[1] On copper content. [2] On total weight. "a. v." means ad valorem.

Old Metals

Dealers' buying prices, wholesale quantities:	Cents. lb.	Duty	U. S. Import Tax
Heavy copper and wire, mixed	7¼to 7⅜	Free	4c. per pound on copper content
Light copper	6⅞to 7	Free	
Heavy yellow brass	4⅝to 7¾	Free	
Light brass	3⅞to 4	Free	
No. 1 composition	7 to 7⅛	Free	
Composition turnings	6¾to 6⅞	Free	
Heavy soft lead	4¼to 4⅜	2⅛c. lb.	
Old zinc	2⅝to 2¾	1½c. lb.	
New zinc clips	3⅛to 3¼	1½c. lb.	
Aluminum clips (new, soft)	13 to13¼	4c. lb.	
Scrap aluminum, cast	7¾	4c. lb.	
Aluminum borings—turnings	4 to 4¼	4c. lb.	None
No. 1 pewter	26 to27	Free	
Electrotype	4⅜to 4⅝	2⅛c. lb.*	
Nickel anodes	27 to28	10%	
Nickel clips, new	28 to29	10%	
Monel scrap	8 to15	10% av.	

*** On lead content.**

Wrought Metals and Alloys

The following are net BASE PRICES per pound, to which must be added extras for size, shape, quantity, packing, etc., or discounts, as shown in manufacturers' lists, effective since Oct. 14, 1938. Basic quantities on most rolled or drawn brass and bronze items below are from 2,000 to 5,000 pounds; on nickel silver, from 1,000 to 2,000 pounds.

Copper Material

	Net base per lb.	Duty*
Sheet, hot rolled	19⅜c.	2½c. lb.
Bare wire, soft, less than carloads	15⅜c.	25% a. v.
Seamless tubing	19⅞c.	7c. lb.

*** Each of the above subject to import tax of 4c. lb. in addition to duty under Revenue Act of 1932.**

Nickel Silver

Net base prices per lb. (Duty 30% ad valorem.)

Sheet Metal		Wire and Rod	
10% Quality	25⅛c.	10% Quality	28¾c.
15% Quality	27½c.	15% Quality	32 c.
18% Quality	28½c.	18% Quality	34⅞c.

Brass and Bronze Material

	Yellow Brass	Red Brass 80%	Comm'l. Bronze	Duty	
Sheet	17½c.	18⅜c.	19½	4c. lb.	U. S. Import Tax 4c. lb. on copper content.
Wire	17¾c.	18⅝c.	19⅝	20%	
Rod	13⅜c.	18⅝c.	19⅝	4c. lb.	
Angles, channels	26c.	26⅞c.	28	12c. lh	
Seamless tubing	20¼c.	20⅞c.	21⅞	8c. lb.	
Open seam tubing	26c.	26⅞c.	28	20% a. v.	

Tobin Bronze and Muntz Metal

(Duty 4c. lb.; import tax 4c. lb. on copper content.)

Net base prices per pound.	
Tobin Bronze Rod	19⅜c.
Muntz or Yellow Rectangular and other sheathing	20¾c.
Muntz or Yellow Metal Rod	16⅞c.

Aluminum Sheet and Coil

(Duty 7c. per lb.)

Aluminum sheet, 18 ga., base, carload lots, per lb.	33.00c.
Aluminum coils, 24 ga., base price, carload lots, per lb.	28.50c

Rolled Nickel Sheet and Rod

Net Base Prices

Cold Drawn Rods	50c.	Standard Cold Rolled Sheet	49c.
Hot Rolled Rods	45c.		

Monel Metal Sheet and Rod

Hot Rolled Rods (base)	35c.	No. 35 Sheets (base)	37c.
Cold Drawn Rods (base)	40c.	Std. Cold Rolled Sheets (base)	39c.

Silver Sheet

Rolled sterling silver (Nov. 29) 45c. per Troy oz. upward according to quantity. (Duty, 65% ad valorem.)

Zinc and Lead Sheet

	Cents per lb. Net Base	Duty
Zinc sheet, carload lots standard sizes and gauges, at mill, less 7 per cent discount	9.75	2c. lb.
Zinc sheet, 1200 lb. lots (jobbers' prices)	10.75	2c. lb.
Zinc sheet, 100 lb. lots (jobbers' prices)	14.75	2c. lb.
Full Lead Sheet (base price)	8.00	2⅝c. lb.
Cut Lead Sheet (base price)	8.25	2⅝c. lb.

Block Tin, Pewter and Britannia Sheet

(Duty Free)

This list applies to either block tin or No. 1 Britannia Metal Sheet, No. 23 B. & S. Gauge, 18 inches wide or less; prices are all f. o. b. mill:

500 lbs. over	15c. above N. Y. pig tin price
100 to 500 lbs.	17c. above N. Y. pig tin price
Up to 100 lbs.	25c. above N. Y. pig tin price
Up to 100 lbs.	25c. above N. Y. pig tin price

Supply Prices on page 598.

INDEX TO VOLUME 36

METAL INDUSTRY, January-December, 1938

ARTICLES

Acid Copper Plating Baths, A Fungus in .. 19
Activated Carbon in Electroplating Solutions. 553
Aids for Filtration of Electroplating Solutions, Filter ... 556
Aids with Plating Solutions, Methods of Mixing Filter ... 558
Alkaline Plating Baths, pH Studies of 279
Alkaline Plating Solutions, the pH of .. 116, 170
Alloy Products: Tubes, etc., Methods of Joining Copper 6, 174, 275, 382, 427, 472
Aluminum Alloy Automobile Pistons by Immersion, Tin Plating ... 11
Aluminum Funnels for "Mauretania" 130
Aluminum, New Method of Plating on 475
Aluminum, Plating Copper on ... 76
Aluminum, The Resistance Welding of 65
Amalgams, The Recovery of Silver, Gold and Mercury from Precious Metal 22
American Electroplating Society 26th Annual Convention ... Adv. 6
Anaconda Electro-Sheet Copper, Development and Use of ... 218
Annealing in Controlled Atmospheres, Non-Ferrous ... 69
Articles in a Basket, Chromium Plating Small ... 232
Aspects, Trichlorethylene Degreasing-Engineering ... 286
Atmospheres, Non-Ferrous Annealing in Controlled ... 69
Attention! The Polishing Department Needs More ... 9
Automatic Buffing, Selection of Compounds for ... 567
Automatically, Zipper Fasteners Plated 74
Automobile Pistons by Immersion, Tin Plating Aluminum Alloy ... 11

Basket, Chromium Plating Small Articles in a ... 232
Bath, A Study of the Rochelle Salt-Copper Plating ... 15, 77, 120, 169
Baths, A Fungus in Acid Copper Plating .. 19
Baths, A Study of Cyanide Copper Plating .. 560
Baths, pH Studies of Alkaline Plating 279
Bearings Give Long Service, Copper-Lead .. 10
Better Fire Protection for the Metal Finishing Department ... 114
Brass and Bronze Valves and Fittings, Manufacturing High Grade ... 469
Brass Plating Process, A New White 513
Bronze Valves and Fittings, Manufacturing High Grade Brass and ... 469
Buffing, Selection of Compounds for Automatic ... 567
Buffing Without Leaving Marks ... 82
Business Machines, Production Plating of .. 414
Buttons to Modern Novelty Finishes, From Working Clothes ... 4

Carbon in Electroplating Solutions, Activated 553
Casting Digest, Metal .. 26, 86, 134, 190, 240, 292, 344, 391, 435, 483
Chemical Composition, Fabricating Properties of Nickel Silver as Affected by its .. 62
Chromium Plating Small Articles in a Basket 232
Clothes Buttons to Modern Novelty Finishes, From Working ... 4
Composition, Fabricating Properties of Nickel Silver as Affected by its Chemical 62
Compounds for Automatic Buffing, Selection of ... 567
Control of Electroplating Processes, Technical ... 336, 374
Control of Polishing Supplies, Cost and .. 164
Control of Rust Proofing, Remote ... 379
Controlled Atmospheres, Non-Ferrous Annealing in ... 69
Convention, American Electroplating Society 26th Annual ... Adv. 6
Copper Alloy Products: Tubes, etc., Methods of Joining ... 6, 174, 275, 382, 427, 472
Copper, Development and Use of Anaconda Electro-Sheet ... 218
Copper on Aluminum, Plating ... 76
Copper Plating Bath, A Study of the Rochelle Salt- ... 15, 77, 120, 169
Copper Plating Baths, A Fungus in Acid .. 19
Copper Plating Baths, A Study of Cyanide .. 560
Cost and Control of Polishing Supplies 164
Cost of Nickel Plating, The ... 422
Cost Reduction in the Plating Department .. 370
Costs by Press Shop Methods, Lowering Finishing ... 270
Cyanide Copper Plating Baths, A Study of .. 560

Degreasing-Engineering Aspects, Trichlorethylene ... 286
Department, Better Fire Protection for the Metal Finishing ... 114
Department, Cost Reduction in the Plating .. 370
Department Needs More Attention! The Polishing ... 9
Depositing Uniform Thicknesses of Metal for Plating to Specifications ... 478
Deposits, Physical Properties and Uses of Heavy Nickel ... 385, 424
Development and Use of Anaconda Electro-Sheet Copper ... 218
Digest, Electroplating ... 528
Digest, Metal Casting ... 26, 86, 134, 190, 240, 292, 344, 391, 435, 483
Digest, Metallurgical ... 527
Dip Galvanizing Practice, Hot- ... 230

Efficiency by Improved Spraying Technique, Increased Paint ... 511
Electrodeposition of Metals from Non-Aqueous Solutions, The ... 284
Electroplater, Fifty-three Years as an .. 182, 377
Electroplating Digest ... 528
Electroplating Industry—Rubber Linings an Important Factor in the ... 225
Electroplating, Metal Pictures by ... 184
Electroplating Processes, Technical Control of ... 336, 374
Electroplating Society 26th Annual Convention, American ... Adv. 6
Electroplating Solutions, Activated Carbon in 553
Electroplating Solutions, Filter Aids for Filtration of ... 556
Electro-Sheet Copper, Development and Use of Anaconda ... 218
Electrotype Industry, The Modern ... 332
Engineering Aspects, Trichlorethylene Degreasing ... 286
Equipment, Tellurium Lead for Plating and Pickling ... 563
Exposure Tests of Plating on the Non-Ferrous Metals ... 372

Fabricating Properties of Nickel Silver as Affected by its Chemical Composition ... 62
Factor in the Electroplating Industry—Rubber Linings—An Important ... 225
Fasteners Plated, Automatically, Zipper ... 74
Fifty-three Years as an Electroplater .. 182, 377
Filter Aids for Filtration of Electroplating Solutions ... 556
Filter Aids with Plating Solutions, Methods of Mixing ... 558
Finish for a Specific Product, How to Choose the Right Organic ... 234
Finishes, From Working Clothes Buttons to Modern Novelty ... 4
Finishes, Notes on Metal ... 522
Finishing Costs by Press Shop Methods, Lowering ... 270
Finishing Department, Better Fire Protection for the Metal ... 114
Finishing of Jewelry and Novelties, Modern Plating and ... 221
Finishing Operations, Wastes in Metal ... 186
Fire Protection for the Metal Finishing Department, Better ... 114
Fittings, Manufacturing High Grade Brass and Bronze Valves and ... 469
From Working Clothes Buttons to Modern Novelty Finishes ... 4
Fungus in Acid Copper Plating Baths, A .. 19
Funnels for "Mauretania," Aluminum ... 130

Galvanizing Practices, Hot-Dip ... 230
Galvanoplastic Reproduction from Metal Moulds ... 418
Getting the Most Out of Your Lacquer ... 430
Gold and Mercury from Precious Metal Amalgams, The Recovery of Silver, ... 22
Goldsmiths' Guilds of London ... 570
Guilds of London, Goldsmiths' ... 570

Heavy Nickel Deposits, Physical Properties and Uses of ... 385, 424
High Grade Brass and Bronze Valves and Fittings, Manufacturing ... 469
Hot-Dip Galvanizing Practice ... 230
Housecleaning, A Modern Plant Needs Modern ... 129
How to Choose the Right Organic Finish for a Specific Product ... 234

Immersion, Tin Plating Aluminum Alloy Automobile Pistons by ... 11
Important Factor in the Electroplating Industry—Rubber Linings ... 225
Increased Paint Efficiency by Improved Spraying Technique ... 511
Industry, Rubber Linings — an Important Factor in the Electroplating ... 225
Industry, The Modern Electrotype ... 332

Jewelry and Novelties, Modern Plating and Finishing of ... 221
Jewelry, Manufacture of Precious Metal Plate for ... 2
Joining Copper Alloy Products; Tubes, etc. Methods of ... 6, 174, 275, 382, 427, 472

Lacquer, Getting the Most Out of Your 430
Lacquering Methods ... 380
Lead for Plating and Pickling Equipment, Tellurium ... 563
Linings—An Important Factor in the Electroplating Industry ... 225
London, Goldsmiths' Guilds of ... 570
Long Service, Copper-Lead Bearings Give .. 10
Lowering Finishing Costs by Press Shop Methods ... 270

Machines, Production Plating of Business .. 414
Manufacture of Precious Metal Plate for Jewelry ... 2
Manufacturing High Grade Brass and Bronze Valves and Fittings ... 469
Marks, Buffing Without Leaving ... 82
"Mauretania," Aluminum Funnels for ... 130
Mercury from Precious Metal Amalgams, The Recovery of Silver, Gold ... 22
Metal Amalgams, The Recovery of Silver, Gold and Mercury from Precious ... 22
Metal Casting Digest ... 26, 86, 134, 190, 240, 292, 344, 391, 435, 483
Metal Finshes, Notes on ... 522
Metal Finishing Department, Better Fire Protection for the ... 114
Metal Finishing Operations, Wastes in ... 186
Metal for Plating to Specifications, Depositing Uniform Thicknesses of ... 478
Metal Moulds, Galvanoplastic Reproductions from ... 418
Metal Pictures by Electroplating ... 184
Metal Plate for Jewelry, Manufacture of Precious ... 2
Metallurgical Digest ... 527
Metals, Exposure Tests of Plating on the Non-Ferrous ... 372
Metals from Non-Aqueous Solutions, The Electrodeposition of ... 284
Methods of Plating Nickel on Stainless Steel, A Simple ... 330
Method of Plating on Aluminum, New ... 475
Methods, Lacquering ... 380
Methods, Lowering Finishing Costs by Press Shop ... 270
Methods of Joining Copper Alloy Products: Tubes, etc. ... 6, 174, 275, 382, 427, 472
Methods of Mixing Filter Aids with Plating Solutions ... 558
Mixing Filter Aids with Plating Solutions, Methods of ... 558
Modern Electrotype Industry, The ... 332
Modern Novelty Finishes, From Working Clothes Buttons to ... 4
Modern Plant Needs Modern Housecleaning, A ... 129
Modern Plating and Finishing of Jewelry and Novelties ... 221
Most Out of Your Lacquer, Getting the 430
Moulds, Galvanoplastic Reproductions from Metal ... 418

New in Silver Plating, Something ... 166
Nickel Deposits, Physical Properties and Uses of Heavy ... 385, 424
Nickel on Stainless Steel, A Simple Method of Plating ... 330

Nickel Plating, The Cost of ... 422
Nickel Silver as Affected by its Chemical Composition, Fabricating Properties of ... 62
Non-Aqueous Solutions, The Electrodeposition of Metals from ... 284
Non-Ferrous Annealing in Controlled Atmospheres ... 69
Non-Ferrous Metals, Exposure Tests of Plating on the ... 372
Notes on Metal Finishes ... 522
Novelties, Modern Plating and Finishing of Jewelry and ... 221
Novelty Finishes, From Working Clothes Buttons to Modern ... 4

Organic Finishes for a Specific Product, How to Choose the Right ... 234

Paint Efficiency by Improved Spraying Technique, Increased ... 511
pH of Alkaline Plating Solutions, The ... 116, 170
pH Studies of Alkaline Plating Baths ... 279
Physical Properties and Uses of Heavy Nickel Deposits ... 385, 424
Pickling Equipment, Tellurium Lead for Plating and ... 563
Pictures by Electroplating, Metal ... 184
Pistons by Immersion, Tin Plating Aluminum Alloy Automobile ... 11
Plant Needs Modern Housecleaning, A Modern ... 129
Plated Automatically, Zipper Fasteners ... 74
Plating Aluminum Alloy Automobile Pistons by Immersion, Tin ... 11
Plating and Finishing of Jewelry and Novelties, Modern ... 221
Plating and Pickling Equipment, Tellurium Lead for ... 563
Plating Bath, A Study of the Rochelle Salt-Copper ... 15, 77, 120, 169
Plating Baths, A Study of Cyanide Copper ... 560
Plating Baths, A Fungus in Acid Copper ... 19
Plating Baths, pH Studies of Alkaline ... 279
Plating Copper on Aluminum ... 76
Plating Department, Cost Reduction in the ... 370
Plating Nickel on Stainless Steel, A Simple Method of ... 330
Plating of Business Machines, Production of ... 414
Plating on Aluminum, New Method of ... 475
Plating on the Non-Ferrous Metals, Exposure Tests of ... 372
Plating Process, A New White Brass ... 513
Plating Purposes, Steel for ... 127
Plating Small Articles in a Basket, Chromium ... 232
Plating Solutions, Methods of Mixing Filter Aids with ... 558
Plating Solutions, The pH of Alkaline ... 116, 170
Plating, Something New in Silver ... 166
Plating, The Cost of Nickel ... 422
Plating to Specification ... 339
Plating to Specifications, Depositing Uniform Thicknesses of Metal For ... 478
Polishing Department Needs More Attention! The ... 9
Polishing Supplies, Cost and Control of ... 164
Polishing Technique for Stainless Steel ... 110
Post Scripts ... 529
Practice, Hot-Dip Galvanizing ... 230
Precious Metal Amalgams, The Recovery of Silver, Gold and Mercury from ... 22
Precious Metal Plate for Jewelry, Manufacture of ... 2
Press Shop Methods, Lowering Finishing Costs by ... 270
Process, A New White Brass Plating ... 513
Processes, Technical Control of Electroplating ... 336, 374
Product, How to Choose the Right Organic Finish for a Specific ... 234
Production Plating of Business Machines ... 414
Products: Tubes, etc., Methods of Joining Copper Alloy ... 6, 174, 275, 382, 427, 472
Properties and Uses of Heavy Nickel Deposits, Physical ... 385, 424
Properties of Nickel Silver as Affected by its Chemical Composition, Fabricating ... 62
Protection for the Metal Finishing Department, Better Fire ... 114

Recovery of Silver, Gold and Mercury from Precious Metal Amalgams ... 22
Reduction in the Plating Department, Cost ... 370
Remote Control of Rust Proofing ... 379
Reproductions from Metal Moulds, Galvanoplastic ... 418
Resistance Welding of Aluminum ... 65
Rochelle Salt-Copper Plating Bath, A Study of the ... 15, 77, 120, 169
Rubber Linings—An Important Factor in the Electroplating Industry ... 225
Rust Proofing, Remote Control of ... 379

Salt-Copper Plating Bath, A Study of the Rochelle ... 15, 77, 120, 169
Scripts, Post ... 529
Selection of Compounds for Automatic Buffing ... 567
Shop Methods, Lowering Finishing Costs by Press ... 270
Silver as Affected by its Chemical Composition, Fabricating Properties of Nickel ... 62
Silver, Gold and Mercury from Precious Metal Amalgams, Recovery of ... 22
Silver Plating, Something New in ... 166
Simple Method of Plating Nickel on Stainless Steel, A ... 330
Small Articles in a Basket, Chromium Plating ... 232
Society 26th Annual Convention, American Electroplating ... Adv. 6
Soft Solders ... 517
Solders, Soft ... 517
Solution, Slow Plating ... 517
Solutions, Activated Carbon in Electroplating ... 555
Solutions, Filter Aids for Filtration of Electroplating ... 556
Solutions, Methods of Mixing Filter Aids with Plating ... 558
Solutions, The Electrodeposition of Metals from Non-Aqueous ... 284
Solutions, The pH of Alkaline Plating ... 116, 170
Something New in Silver Plating ... 166
Specification, Plating to ... 339
Specifications, Depositing Uniform Thicknesses of Metal for Plating to ... 478
Spraying Technique, Increased Paint Efficiency by Improved ... 511
Stainless Steel, A Simple Method of Plating Nickel on ... 330
Stainless Steel, Polishing Technique for ... 110
Steel, A Simple Method of Plating Nickel on Stainless ... 330
Steel for Plating Purposes ... 127
Steel, Polishing Technique for Stainless ... 110
Studies of Alkaline Plating Baths, pH ... 279
Study of Cyanide Copper Plating Baths, A ... 560
Study of the Rochelle Salt-Copper Plating Bath, A ... 15, 77, 120, 169
Supplies, Cost and Control of Polishing ... 164

Technical Control of Electroplating Processes ... 336, 374
Technique for Stainless Steel, Polishing ... 110
Technique, Increased Paint Efficiency by Improved Spraying ... 511
Tellurium Lead for Plating and Pickling Equipment ... 563
Tests of Plating on the Non-Ferrous Metals, Exposure ... 372
Thicknesses of Metal for Plating to Specifications, Depositing Uniform ... 478
Tin Plating Aluminum Alloy Automobile Pistons by Immersion ... 11
Trichlorethylene Degreasing—Engineering Aspects ... 286
Tubes, etc., Methods of Joining Copper Alloy Products: ... 6, 174, 275, 382

Uniform Thicknesses of Metal for Plating to Specifications, Depositing ... 478
Uses of Heavy Nickel Deposits, Physical Properties and ... 385, 424

Valves and Fittings, Manufacturing High Grade Brass and Bronze ... 469

Wastes in Metal Finishing Operations ... 186
Welding of Aluminum, The Resistance ... 65
White Brass Plating Process, A New ... 513
Working Clothes Buttons to Modern Novelty Finishes, From ... 4

Years as an Electroplater, Fifty-three ... 182, 377

Zipper Fasteners Plated Automatically ... 74

AUTHORS

Amberg, Richards J. Filter Aids for Filtration of Electroplating Solutions ... 556

Bell, G. Tin Plating Aluminum Alloy Automobile Pistons by Immersion ... 11
Briscoe, H. T. Electrodeposition of Metals from Non-Aqueous Solutions ... 284
Brown, Dale. Tin Plating Aluminum Alloy Automobile Pistons by Immersion ... 11

Cochran, E. W. Polishing Department Needs More Attention! ... 9
Conley, Charles C. Production Plating of Business Machines ... 414

Dirkse, Thedford P. Electrodeposition of Metals from Non-Aqueous Solutions ... 284

Easton, William H. Better Fire Protection for Metal Finishing Department ... 114
Egeberg, Dr. B. Fabricating Properties of Nickel Silver as Affected by its Chemical Composition ... 62

Falk, A. H. Soft Solders ... 517
Fife, George. Manufacture of Precious Metal Plate for Jewelry ... 2
Fulforth, Frederick. Lowering Finishing Costs by Press Shop Methods ... 270
Fulforth, Frederick. Steel for Plating Purposes ... 127

Graham, Dr. A. Kenneth. A Study of the Rochelle Salt-Copper Plating Bath ... 15, 77, 120, 169
Graham, Dr. A. Kennth. pH Studies of Alkaline Plating Baths ... 279

Haas, Joseph. Depositing Uniform Thicknesses of Metal for Plating to Specifications ... 478
Haas, Joseph. The Cost of Nickel Plating ... 422
Hall, Nathaniel. Plating to Specification ... 339
Hall, Wesley F. Zipper Fasteners Plated Automatically ... 74
Hardy, Chas. W. Cost and Control of Polishing Supplies ... 164
Harkins, Dr. H. H. Rubber Linings—An Important Factor in the Electroplating Industry ... 225
Harris, W. B. Trichlorethylene Degreasing—Engineering Aspects ... 286
Heibg, W. A. Activated Carbon in Electroplating Solutions ... 555
Hiers, G. O. Tellurium Lead for Plating and Pickling Equipment ... 563
Hogaboom, George B. The pH of Alkaline Plating Solutions ... 116, 170
Hogaboom, Jr., G. B. Lacquering Methods ... 380
Hoglund, G. O. Resistance Welding of Aluminum ... 65
Hoke, C. M. The Recovery of Silver, Gold and Mercury from Precious Metal Amalgams ... 22
Hook, I. T. Methods of Joining Copper Alloy Products, Tubes, etc. 6, 174, 275, 382, 427, 472

Imhoff, Wallace G. Hot-Dip Galvanizing Practice ... 230
Ingersoll, E. F. Chromium Plating Small Articles in a Basket ... 232

Kohl, L. N. Polishing Technique for Stainless Steel ... 110

Langdon, Palmer H. Notes on Metal Finishes ... 522
Little, Joseph. Goldsmiths' Guilds of London ... 570
LoPresti, Philip J. Wastes in Metal Finishing Operations ... 186

Meyer, Dr. Walter R. Methods of Mixing Filter Aids with Plating Solutions ... 558
Meyer, Dr. Walter R. Plating Copper on Aluminum ... 76
Meyer, Dr. Walter R. Selection of Compounds for Automatic Buffing ... 567
Moore, H. Buffing Without Leaving Marks ... 82

O'Brien, A. L. Development and Use of Anaconda Electro-Sheet Copper ... 218
Oplinger, Floyd. A New White Brass Plating Process ... 513

Porges, Nandor. A Fungus in Acid Copper Plating Baths ... 19
Promisel, N. E. Fabricating Properties of Nickel Silver as Affected by its Chemical Composition ... 62

Read, Harold J. Study of the Rochelle Salt-Copper Plating Bath, A ... 15, 77, 120, 169
Reid, Gerald. A Study of Cyanide Copper Plating Baths ... 560
Robinson, D. W. Fifty-Three Years as an Electroplater ... 182, 377
Ross, W. F. Non-Ferrous Annealing in Controlled Atmospheres ... 69

Schor, George. Galvanoplastic Reproductions from Metal Moulds ... 418
Scribner, C. F. Cost Reduction in the Plating Department ... 370
Sheane, Willoughby G. Increased Paint Efficiency by Improved Spraying Technique ... 511
Shulberg, V. Tin Plating Aluminum Alloy Automobile Pistons by Immersion ... 11
Smith, W. T. Getting the Most Out of Your Lacquer ... 430
Smith, W. T. How to Choose the Right Organic Finish for a Specific Product ... 234
Snyder, C. A. Modern Plant Needs Modern Housecleaning, A ... 129
Snyder, C. C. Polishing Technique for Stainless Steel ... 110
Steers, G. A. Tellurium Lead for Plating and Pickling Equipment ... 563
Stephenson, E. M. Lacquering Methods ... 380
St. John, H. M. Metal Casting Digest 26, 86, 134, 190, 240, 292, 344, 391, 435, 483
St. John, H. M. Metallurgical Digest ... 527

Taormina S. C. Technical Control of Electroplating Processes ... 336, 374
Travers, William J. New Method of Plating Aluminum ... 475
Treppe, Charles P. Metal Pictures by Electroplating ... 184

Wesley, W. A. Physical Properties and Uses of Heavy Nickel Deposits ... 385, 424
Westbrook, Francis A. Manufacture of Precious Metal Plate for Jewelry ... 2
Westbrook, Francis A. Manufacturing High Grade Brass and Bronze Valves and Fittings ... 469
Wood, Donald. A Simple Method of Plating Nickel on Stainless Steel ... 330
Wood, Donald. Something New in Silver Plating ... 166

Young, Dr. C. B. F. A Study of Cyanide Copper Plating Baths ... 560

The Metal Products Manufacturing Industry. A Review of 1937 and a Pre-View of 1938

A Survey

The present and future prospects of this far-flung, diversified field. Fabrication, assembling, plating and finishing, from all points of view: commercial activity; technological development; market conditions of the most important raw materials—Metals.

Summary and Conclusions

Metal Fabricating and Metal Products Manufacturing Industry

Economic. Volume of business in 1937 in the brass mills and in the metal products manufacturing plants was approximately on a par with or a little above 1936. Estimates of business in 1938 indicate a smaller volume than in 1937. Development work on new equipment will go forward at a good rate in 1938. Sentiment about the immediate economic future of the metal products manufacturing industry is *neutral* to *doubtful* mainly because of the policies of the National Government and the labor situation.

Technological. New alloys show a definite trend toward higher strength, higher corrosion resistance and retention of properties at higher temperatures. The use of small percentages of alloying agents (including the rarer metals) is increasing. Zinc base die castings continue to spread into new fields.

Direct production of sheet, rod and tube from molten metal has a very promising future. Equipment with the best prospects seems to be in the fields of welding, electrical heating, precision instruments for process control and machinery for continuous operation.

Electroplating, Metal Polishing and Metal Finishing Industries

Economic. The year 1937 was excellent; appreciably ahead of 1936. The majority of replies estimated that 1938 will be at least as good and probably better than 1937. Active development work is planned for 1938 in new and improved equipment and supplies for this industry. Electroplating and metal finishing are expanding steadily into new fields, industrial as well as decorative. Sentiment about the immediate economic future of this industry is *strongly optimistic* based on the fact that the industry is growing and the belief in the nearby upswing of the business cycle.

Technological. Many advances were made in the knowledge of fundamentals, including improvements in metal cleaning, purification of solutions and analytical methods. Important progress was recorded in the control of solutions by pH measurement, the measurement of thickness of deposits and the development of non-metallic finishes of the synthetic resin and chlorinated rubber type. Several new processes have far-reaching possibilities.

Prospects for the coming year are encouraging for the increased use of hard chromium; the pretreatment of steel and zinc base alloys for subsequent finishes; the use of synthetic lacquers and enamels; heavier coatings of nickel for protection against corrosion and rust; Rochelle salt-copper plating baths; bright plating solutions for nickel, copper and zinc; electrolytic descaling; anodic finishes for aluminum.

Equipment and supplies with the most hopeful outlook for wider use include: automatic machinery for descaling, cleaning, plating and polishing; metallurgical microscopes, magnetic instruments and chemical apparatus for determining the thickness of deposited metal; control instruments for the operation of electroplating solutions; cements for dressing polishing wheels.

The electroplating, metal polishing and metal finishing division is, from all indications of this Survey, the most active, the most alert and the most optimistic of any branch of the metal products manufacturing industry.

Its great need is to bring its equipment up to date.

Metal Markets

The rise in metal prices during the first part of the year was due primarily to *Speculation.*

The fall during the latter part of the year was due primarily to *decreased industrial demand.*

The year 1938 should bring higher prices for most metals, but not sufficiently higher for "get-rich-quick" speculation.

Reservation

All of the above "forecasts" are dependent on the attitude of our Government toward Business.

A Review of 1937 and a Pre-View of 1938

IN THE Middle Ages, in walled cities constantly on the lookout for attack, the question on the lips of every anxious citizen was "Watchman—what of the night?" Today, in a nation torn with commercial and industrial strife and uncertainty, we ask a question with the same meaning, but using different words to suit our present-day setting. We ask "What is happening to business?" For we know that in the last analysis our physical well-being, our standards of living, our education, our culture—perhaps even our moral standards—depend upon our economic health—Business.

Upon METAL INDUSTRY has fallen the duty of acting as watchman for its City—The Metal Products Manufacturing Industry. We are delegated to stand in the watch tower, to gaze nearby and far off, and to tell our harassed citizens over the length and breadth of the Land:

> What happened to our business in 1937.
> What seems likely to happen to our business in 1938.

That the task of viewing the past and estimating the future is difficult, is an old story. That it is vastly more difficult in the metal products manufacturing industry than in most fields is not so generally realized. What is that industry? Is it safety pins or is it flying machines? Is it ash trays or stream-lined trains? Is it five-and-ten-cent spoons or the finest silverware?

It is no one of these products. It is *all of them—and hundreds more.*

To judge such a number and variety of products, we must have something which applies to all of them; some common denominators which run throughout this heterogeneous multitude.

The technological factors are at once clear. All metal products must first be fabricated into shapes and parts. The parts must then be assembled. The assembled articles must be plated. The plated articles must be finished. The technological common denominators are, therefore, the manufacturing operations necessary to transform raw materials — metals — into consumer merchandise. They consist of Fabrication — Assembling — Plating — Finishing.

From the commercial aspect the same grouping obtains. Each of these classes of operations constitutes an industry of its own, with many millions of dollars invested in plant and equipment to produce machinery and supplies for its use, with thousands of men dependent upon it for their livelihood, with numerous technical societies and trade associations devoted to its welfare.

These four "Industries"—their technology and their economics—constitute the domain of the metal products manufacturing field. It is to the Citizens of this City that METAL INDUSTRY reports.

Method of Obtaining Information

The information was collected by means of questionnaires addressed to leading authorities of the industry. Because of the diversity of operations and interests of the four divisions and the different types of information required —technological and economic—it was necessary to develop not one, but six questionnaires sent to six different groups and types of authorities to elicit the desired information.

The basic principles upon which these questionnaires were drawn up and distributed were:

1. The men *engaged in* an industry are the best judges of its technological situation.

2. The *sellers to* an industry are the best judges of its economic condition.

The table below shows the different questionnaires sent out, the types of authorities to whom they were sent and the division of the industry judged by each questionnaire.

Number of Questionnaires

In all surveys of this character, much depends upon the *number of sources* of information. Naturally, the larger the number, the more complete the total report. Naturally, also, it would have been impossible as well as unnecessary to cover every individual shop. It was decided, therefore, to choose a sample of about five hundred *representative* firms, from the very large to the very small. This constituted a fair cross-section of the industry. *At the same time fully 75% of the output was covered;* the bulk of the output, of course, residing in a comparatively small number of large corporations.

Each questionnaire was accompanied by a letter of transmittal which included the following points of explanation:

> "1. If there are any questions which you do not feel qualified to answer, just leave them blank. If there are any questions on which you do not feel absolutely sure, *please estimate.* We know that your estimates or even guesses will be educated. We know also that a certain number of errors always exist, but that they cancel themselves out in large number of contributions.
>
> "2. We will not divulge your individual report. We shall use it only to obtain totals and the trends of our industry. We will not quote you or mention your name without your permission."

The Returns from the Questionnaires

Since the questionnaires differed in detail, if not in principle, from group to group, the divisions necessarily had to be judged separately. Below, therefore, are the reports from these divisions in the order given in the schedule above.

In reporting the developments listed below, we have adhered to the policy of stating the facts as they were reported to us by the authorities consulted. In a great many instances names are mentioned and credit given

Schedule of Questionnaires

Questionnaire	*Recipients*	*Industry Judged*
II-1-a Economic	Manufacturers of Equipment for making Metal Products	Metal Fabricating Industry (Rolling Mills)
II-1-b Economic	Metal Fabricators (Rolling Mills)	Metal Products Manufacturing Industry
II-1-c-d Economic	Plating Equipment and Supply Houses; Lacquer Mfrs.; Lacquering Equipment Mfrs.	Electroplating, Metal Polishing and Finishing Industry
III-1-a-b Technological	Metallurgists; Rolling Mill Experts; Metal Products Mfg. Experts	Alloys; Fabrication and Rolling; Metal Products Manufacturing Methods
III-1-c-d Technological	Electroplating Chemists; Electroplaters; Metal Polishing and Finishing Experts	Electroplating; Metal Polishing and Finishing
IV Markets	Metal Producers, Metal Traders and Market Experts	Metal Markets

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- Chroprime, for lacquering polished chromium.
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for the advancements and improvements, to individuals or firms as the case might be. This was done with their knowledge and consent. Where developments are reported with no names, this was done either because no name was given or because we were requested to keep the name confidential.

Omissions from this Issue New Equipment and Metal Markets

One word of apology. In our questionnaires appeared questions which read as follows:

> What new equipment for metal products manufacture did you place on the market in 1937?
>
> What new metal products did you place on the market in 1937?
>
> What new products for the electroplating, metal polishing and finishing industry did you place on the market in 1937?
>
> Within your knowledge what outstanding new equipment, machinery, control instruments, materials and supplies were first offered in 1937 for the manufacture of metal products?
>
> Within your knowledge what outstanding new equipment, machinery, control instruments, materials and supplies were first offered for electroplating, polishing and finishing metal products in 1937?

The answers to these questions were most illuminating—and encouraging. We found, however, that to include them all would call for much more space than is available for this article. Since we were reluctant to condense the material by omitting some or "cutting and squeezing," it was decided to omit these questions and answers at this time and to publish them all together, in another article, in a later issue.

For the same reason—lack of space—the reports on Metal Markets were also omitted. The summary and conclusions on the market for metals appears on the first page of this Review (p. 7 of this Section). The detailed answers will appear in our February issue.

Questionnaire II-1-a. Economic. Sent to Manufacturers of Equipment for Making Metal Products, to Judge the Metal Fabricating (Rolling Mill) Industry

Question 1. How does your estimated total dollar volume of business with the metal products manufacturing industry in 1937 compare with 1936?

Of those who replied 40% reported no gain or loss.

In the remaining 60%, all reported gains ranging from 18% to 50%.

No one reported business in 1937 below 1936.

Conclusion: 1937, as a whole, ran well ahead of 1936.

Question 2. What is your estimate of your dollar volume of business with the metal products manufacturing industry in 1938 compared with 1937?

Of those who replied, 30% estimated no gain or loss.

30% estimated a loss in 1938.

40% estimated a gain in 1938.

Conclusion: Predictions about 1938 business vary and no definite conclusion—*either optimistic or pessimistic*—can be drawn from this group of replies.

Question 3. Do you intend to market any new equipment for metal products manufacturing during 1938?

Of those who replied, 20% did not answer this question. It is probable, although not certain, that if pressed, their answer would have been "No." The balance, 80%, all answered "Yes."

Conclusion: A large majority of the manufacturers of metal fabricating, cutting and working equipment, intend to continue development work in 1938. *This is a very encouraging sign.* Almost all the replies requested us to keep confidential the details of their plans for 1938, but the character of the answers to this rather intimate question was such as to prove conclusively that there will be no relaxation of effort on the part of the equipment manufacturers in metal products manufacturing lines.

Question 4. On the whole, are you optimistic, neutral, doubtful or pessimistic about the metal products manufacturing industry in 1938?

Of those who replied, 20% were pessimistic.

40% were doubtful or neutral.

40% were optimistic.

Conclusion: Sentiment is evenly divided, with not enough weight in any direction to show any decided opinion. From these replies, no definite conclusion—either *optimistic or pessimistic*—can be drawn.

Question 5. Upon what do you base your opinion in the preceding question? (1) The policies of the National Government (2) The natural swing of the business cycle (3) Labor conditions (4) Current conditions in the industry.

All those who in Question 4 above, reported themselves pessimistic, agreed that the causes of their pessimism were:

1. The policies of the National Government.
2. Labor conditions.

Those who were doubtful or neutral gave as their reasons:

1. The policies of the National Government.
2. Labor conditions.

Only one concern gave as its reason for being doubtful the belief that the industry is stationary.

Most of those who were optimistic believed that the metal products manufacturing industry is growing. A minority felt that the natural swing of the business cycle would bring us back. One concern felt optimistic because of the policies of the National Government.

Conclusion: Doubt and pessimism are caused almost entirely by the policies of the National Government and the labor situation. Optimism is caused mainly by the belief that this industry is growing and that to some extent the natural swing of the business cycle will pull us out of the rut. The following statement by *N. W. Pickering*, President of the *Farrel-Birmingham Company, Inc.*, Ansonia, Conn., is undoubtedly representative of the opinion of a large part of our industry.

> "As to the immediate future in the heavy industries I doubt if we can expect any betterment in conditions until the latter part of the summer of 1938. On the other hand, I doubt if conditions get much worse than they are now. This period may be a blessing in disguise, as it may check the activities of labor unions which have caused a distortion of cost elements, with the result that purchases have been curtailed due to prices exceeding what is considered the fair value of the product. Men can

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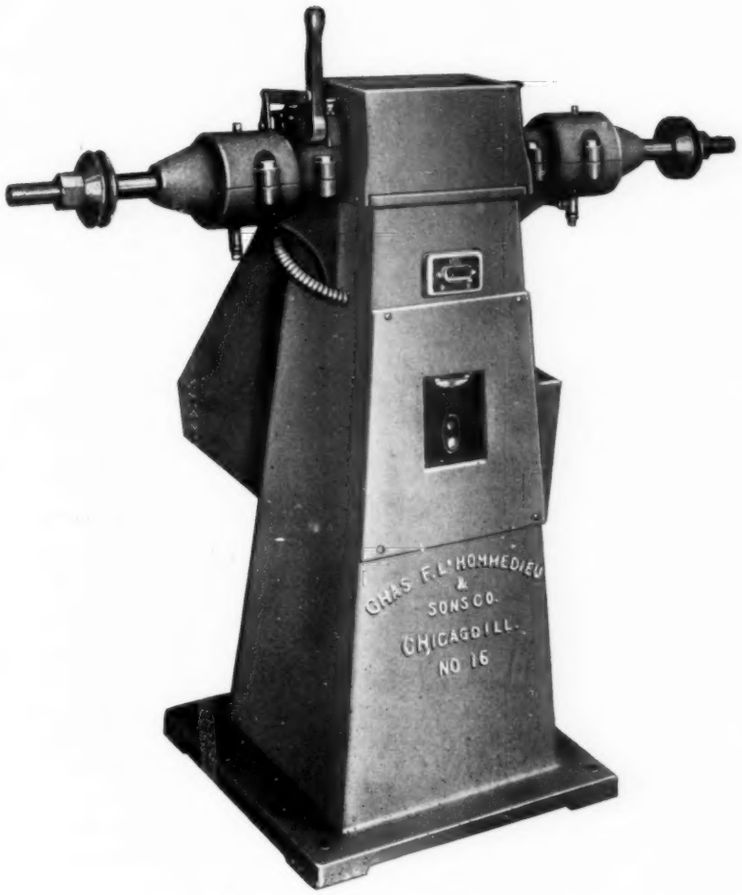

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A Review of 1937 and a Pre-View of 1938

destroy but, in most cases, it requires Nature to do the healing. Man has destroyed our financial and social set up during the last four years. The real answer must be dependent upon whether or not Man will cease this destruction. I do not believe that there is any sincere change in front on the part of the Administration. Fear may cause them to cease temporarily their more damaging activities. In the long run, there is only one hope, and that is the education of the mass of the people (not Mr. Roosevelt's so-called submerged one-third) who will decide that they prefer our free, and perhaps risky, plan of Society to the regimented and restricted plan proposed by the Government."

Questionnaire II-1-b. Economic. Sent to Metal Fabricators (Rolling Mills) to Judge the Metal Products Manufacturing Industry

Question 1. How does your estimated volume of business in fabricated metals and metal products in 1937 compare with 1936?

Conclusion: Replies agreed almost unanimously that 1937 had been practically on a par with 1936.

Question 2. What is your estimate of your volume of business in fabricated metals and metal products in 1938 compared with 1937?

About 25% of those who replied estimated that 1938 business would be about the same as 1937 in volume.

The balance looked for less business in 1938 than in 1937.

Conclusion: The industry as a whole expects to do less business in 1938.

Question 3. Into what new fields, industries or markets did your metal products go in 1937?

From the replies received there is little evidence that the metal fabricators went into new fields in 1937. Probably no new large fields are opening for metal products at this time and the present fields are thoroughly known to all of the mills, and very well covered.

Nickel, however, is one exception. New applications in the automotive field include the use of Monel seamless tubing for the drinking water equipment on large buses and the fish-pole type of radio aerial for passenger car installations. A study of Monel as a material for lithographic plates was initiated and it indicates that Monel will have wide application because of its long life and resistance to corrosion by caustic. Flexible Monel hose, strong enough to support more than 7,000 pounds of weight without collapsing, has been developed. A new type of Monel sheet with an improved finish and an increased resistance to denting was developed. Another new product is ebonised Monel used for heat deflectors in range units, blue-black in color. A new household field for Monel is in laundry tubs and rods in automatic dryers.

Colored nickel silver castings, made by varing the quantity of copper in the mixture, have attracted the attention of plumbing supply manufacturers. Very pale pinks to light greens have been obtained.

Conclusion: The replies show few unusual developments in new markets for manufactured metal products in 1937.

Question 4. Do you intend to market any new metal products during 1938?

Answers—rather lack of answers—to this question disclosed a reluctance to give information—perhaps prematurely at any rate. The only fabricator who admitted plans for going into new products in 1938, was *The American Brass Company*, Waterbury, Conn.

Question 5. Do you intend to sell your metal products in new fields, industries or markets in 1938?

The only fabricator who stated intentions of expanding into new territory was *The American Brass Company*. They intend to sell products for hot water heating systems; also for gas lines, (new lines for new fields).

Question 6. Please name the industries, which as far as you can see, show the most promise for your metal products in 1938.

The industries with especially good prospects for 1938 were reported as follows:

Household electrical appliances
Industrial electrical products
Aviation
Building industry
Welding industry
Precision instruments

Conclusion: It is interesting to note that the building industry is given serious consideration, even though it is, at this time, still in a comparatively low state. Some fabricators see a rise in prospect (but when?) and they are preparing to enjoy what should be a very profitable market.

Question 7. On the whole, are you optimistic, neutral, doubtful or pessimistic about the metal products industry in 1938, and upon what do you base your opinion?

Almost all of those who reported were doubtful or pessimistic because of (1) the policies of the National Government, and (2) labor conditions.

One concern reported optimism based on the hope of a revision of the Government tax policies.

Conclusion: Candor compels us to admit that the reports from this division arouse no enthusiasm about the prospects for 1938. They are much less optimistic in tone than the group of equipment manufacturers reported above. Whether fabricators have a greater element of conservatism (as might be evidenced by the noticeable reluctance to give information) or whether they are closer to the ultimate consumer and have better access to facts, and are consequently much better informed about actual conditions, we have no way of telling. At any rate, the metal fabricators are not over hopeful for 1938.

Additional Data. The trends of a number of metal-consuming industries can be discerned from the Current Industrial Reports issued by the Bureau of the Census. For example: Air conditioning is far above last year and has excellent prospects for 1938. Automobiles are falling behind 1937. Unofficial estimates range between 4,000,000 and 4,500,000 cars, compared with 5,000,000 in 1937. Products showing an upward trend are electrical goods, electric trucks and tractors and electric locomotives for mining and industrial use. A downward trend is in evidence in radiators, domestic pumps, water systems and windmills, range boilers and hot water tanks, measuring and dispensing pumps, railroad locomotives, steel office furniture and white base anti-friction metals.

We can also obtain a glimpse of 1938 from the statistics of railway buying. The railroads in 1937 bought a total of equipment and materials from the manufacturing industry of $846,000,000 compared with $761,000,000 in 1936. Their prospects for spending in 1938 are poor, however, unless they are allowed an increase in rates, for which they have petitioned the Interstate Commerce Commission.

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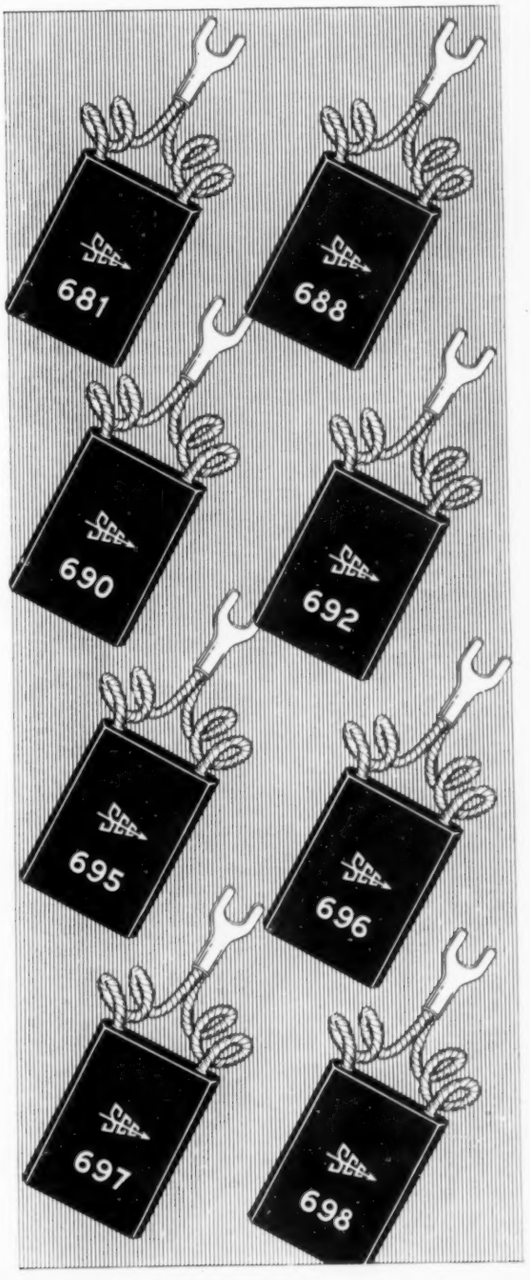

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A Review of 1937 and a Pre-View of 1938

Questionnaire II-1-c-d. Economic. Sent to Plating Supply Houses, Lacquer Manufacturers and Lacquer Equipment Manufacturers to Judge the Electroplating, Metal Polishing and Metal Finishing Industry

Question 1. How does your estimated total dollar volume of business with the electroplating, metal polishing and metal finishing industry in 1937 compare with 1936?

These replies reported business in 1937 from 10% below to 90% above 1936.

5% reported a loss of 5%.
25% reported gains of 10% to 17%.
30% reported gains of 20% to 25%.
15% reported gains of 30% to 35%.
10% reported gains of over 50%.

Conclusion: The majority of the reports were grouped in the neighborhood of 10% to 25% increase for 1937 over 1936. Clearly, this industry had an excellent year.

Question 2. What is your estimate of your dollar volume of business with the electroplating, metal polishing and metal finishing industry in 1938 compared with 1937?

12% of the replies predicted less business in 1938.
30% predicted approximately the same in 1938 as in 1937.
58% predicted more business in 1938.

Conclusion: The weight of opinion in this group lies heavily toward optimism for 1938.

Question 3. Into what new fields, industries or markets did your products go in 1937?

The following new fields were reported:

Aviation	Railroads
Chemical machinery	Steel mills
Stainless steel finishing	Paper manufacture
Air conditioning	Textile manufacture
Farm implements	Electric cables
Special machines for rubber finishing	

Conclusion: The above list is long because it includes all the industries, new to the individual firms who entered them in the past year. Its length is full of significance, showing that equipment and supply houses are actively prospecting new fields for metal finishes.

Electroplating was once considered only a decorative gloss to make an article catch the customer's eye. To the manufacturer it was a thorn in his side because of the difficulty of control. The above list of industries shows that electroplating is expanding rapidly into *industrial* fields where it is making a name for itself on the grounds of *utility* as well as beauty.

Question 4. Do you intend to market any new products for the electroplating, metal polishing and metal finishing industry in 1938?

Of those who replied 58% stated that they would market new products during the coming year.

Conclusion: This bears out the optimism displayed in the answers to Question 2. But it also shows more; it shows a willingness to back that optimism by making expenditures, a fact that makes the optimistic prediction *more likely to become true.*

Question 5. If you wish to do so, please state briefly what these new products will be.

New products scheduled for 1938 were recorded as follows:

New tumbling barrels
Improved dust collectors
Larger sizes of variable speed buffers
Rubber paint for corrosion prevention
Solvents and metal cleaning compounds for metal cleaning
New polishing grain
Wire mesh riddling barrel for sorting sawdust from work

Conclusion: A ticklish question to answer as it involved disclosing plans for the future. It was understandable, therefore, that the number of replies would be few. Nevertheless the information received bore out the indications of intense activity shown by the other reports from this industry.

Question 6. Do you intend to sell your equipment or supplies for electroplating, metal polishing and metal finishing in new fields, industries or markets in 1938?

Of those who replied, 50% answered that they would enter new markets in 1938.

Conclusion: This percentage is unexpectedly high, again corroborating the indications of activity given above.

Question 7. If you wish to do so, please state briefly what those fields, industries or markets are.

New fields, industries or markets reported were the following:

All types of acid pickling, using rubber lined steel tanks	Corrosion prevention in all fields
Aviation	Oil burners
Railroads	Air conditioning
	Chemicals

Conclusion: Another list full of meaning. Any one of the above industries can develop into a large market for electroplating; still more evidence that the industry is active and growing.

Question 8. What industries, as far as you can see, show the most promise for your electroplating, metal polishing and metal finishing equipment and supplies? *Please note especially good prospects.*

The following industries were reported as *especially good.*

Steel	Building
Automobiles and trucks	Novelties
Household electrical appliances	Clocks and watches

The following were listed as good prospects.

Marine	Machinery (hard plating and "building up")
Aviation	Can manufacturing
Jewelry (high grade, moderate and low priced)	Railroads
Textile printing	
Paper manufacturing	

Conclusion: The above list is interesting because it corroborates the general impression of the fields which

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are the backbone of the electroplating industry and also because it again brings up the new fields which are just beginning to be worked (steel, can making, textile printing and paper manufacturing, for example.)

Question 9. On the whole, are you optimistic, neutral, doubtful or pessimistic about the electroplating metal polishing and metal finishing industry in 1938? Upon what do you base your opinion?

Of those who replied 7% expressed themselves as pessimistic, mainly because of the policies of the National Government. Only one firm gave the opinion that the industry is declining.

9% reported themselves doubtful; almost all because of the policies of the National Government.

23% reported themselves neutral. Causes, about evenly divided between policies of the National Government and the labor situation. Two firms reported that in their opinion the industry is declining.

61% *of those who replied expressed optimism.* Their reasons were evenly divided between the belief that the industry is growing and the anticipated upward swing of the business cycle. A few firms reported that their optimism is based on the policies of the National Government.

The following excerpt from a report from a very large corporation is very encouraging:

> "We are optimistic about business prospects of 1938 although at this writing there may be some question as to this optimism. We do think that the process business cycle had not reached its zenith by any means before we went into the present recession, and we feel that not long after the first of the year the curve will be on the upswing again, which will increase all business, and particularly the electroplating, metal polishing and metal finishing industry."

Conclusion: The decided majority of opinion is toward optimism based on the fact that the industry is growing and that the normal operation of the business cycle will result in an upward trend in the near future.

The electroplating, metal polishing and metal finishing division is, from all indications of this Survey, the most active, the most alert and the most optimistic of any branch of the metal products manufacturing industry.

Questionnaire III-1-a-b. Technological. Sent to Metallurgists, Rolling Mill Experts and Metal Products Manufacturing Experts, to Judge Metal Fabrication and Rolling, and Metal Products Manufacturing Methods

Question 1. Within your knowledge what outstanding new non-ferrous alloys were first placed commercially in use in 1937?

The following alloys were reported.

Trodaloy No. 1, 2.6% Co; 0.4% Be; 97% Cu. Combines 45,000 lb. proportional limit, 20% elongation, 220-250 Brinell. Uses: resistance welding electrodes (for stainless steel); soldering iron tips; electrically conducting springs, bearings, shafts, bushings; collector rings; strong Cu castings (heat treated).

Trodaloy No. 7, 0.4% Cr; 0.1% Be; 99.5% Cu. Castings. Combines 15-18,000 lb. proportional limit with 75% electrical conductivity of Cu (heat treated). Wrought: combines 35,000 lb. proportional limit with 10-15% elongation, 140 Brinell. Uses: resistance welding electrode (for plain carbon steels); high conductivity castings; electrically conducting springs.

Z Nickel. Tensile strength over 220,000 lb. per sq. in.; proportional limit 190,000 lb. Useful where high strength alloy of high modulus is required.

Creep resistant lead alloys. Using small additions of copper to fully refined leads improves creep resistance with no adverse effect on corrosion resistance and ductility.

Tin base alloys for bearings including silver, nickel, copper, aluminum, manganese and bismuth. Addition of 1% copper to tin increases tensile strength 120%. Additions up to 5% bismuth increase tensile strength; does not soften under anneal at 250°F.

New techniques and new alloys for filler rods in welding copper base alloys.

Use of antimony as an addition agent to reduce dezincification and corrosion in yellow brasses.

Replacement of lead in machineable copper alloys by tellurium and selenium.

Conclusion: These reports disclose a definite trend toward alloys of (1) higher strength; (2) higher corrosion resistance; (3) retention of properties at higher operating temperatures. The use of small percentages of "addition agents" is growing.

Question 2. Within your knowledge, what outstanding new processes were placed in commercial operation in 1937 for manufacturing metal products?

The following processes were reported.

Improved method of casting jewelry, utilizing some of the techniques and refractories worked out by dentists. It can be used with high melting alloys including platinum, producing designs of delicacy and intricacy and with excellent structure.

Commercial die casting of magnesium base alloys, applying the labor saving features of the die casting process to the lightest of the commercial metals.

The extension of the Hazelett process for the direct rolling of metal from the molten state, to aluminum and steel.

Direct production of magnesium and similar elements as announced by Arthur D. Little, Inc., Boston, Mass.

Production of aluminum coated steel wire — Alplate; corrosion resistant, high tensile strength, resistant to high temperatures.

Production of one-piece wrought copper tees to replace two-piece wrought tees or one-piece cast tees.

Conclusion: A definite trend toward continuous operation, following the practice of the steel mills; continued pressure upon the saving of labor, by eliminating intermediate operations.

Question 3. What non-ferrous alloys, new or old, in your opinion have unusually good prospects for wider use in 1938?

The following "predictions" were made.

Trodaloy No. 1 and No. 7, (see answer to Question 1); estimated 1938 production 500,000 pounds. There may also be a new Trodaloy analysis in 1938.

PLATERS RESEARCH
CONTROL + − SYSTEMS

FREE INTRODUCTORY OFFER

THE CONTROL OF PLATING BATHS IS A PRIME NECESSITY. All progressive metal products manufacturers recognize this basic fact, and a great demand has developed for methods of making accurate analyses of solutions, quickly, simply and economically.

The Platers Research Company has improved a control system which has been operating successfully for over 8 years, and are offering this system for *approximately half the former cost.* As an introduction, we will give away, *free,* all apparatus and glassware comprising the Control Sets with the purchase of the necessary chemicals.**

The figures below speak for themselves:

ACID COPPER CONTROL SET

2—50 c.c. Funnel-top Burettes	3.20
1—10 c.c. Automatic Pipette	3.00
1—Burette Stand	.75
2—Burette Clamps	.70
1—100 ml. Graduate	.50
1—250 c.c. Beaker	.25
1—Erlenmeyer Flask	.25
1—Sampling Tube	.15
1—Brass Tube for Burette Stand	.15
1—Tube of Stopcock Grease	.10
1—Log Book containing complete directions and forms for making and recording the tests	3.50
GIVEN AWAY FREE	**12.55**

Analyzes copper sulphate to within 1/10th part of an ounce per gallon.

Analyzes sulphuric acid to within 1/50th part of an ounce per gallon.

With purchase of 5 bottles of Reagents for testing acid copper solutions.

5—Bottles of Reagents @ 2.50	12.50
Packing Charge	1.00
Total Cost for Acid Copper Set	**13.50***

NICKEL CONTROL SET

All of the above apparatus	12.55
—plus—	
1—50 c.c. Burette	1.60
1—Burette Clamp	.35
2—250 c. c. Beakers	.50
2—Erlenmeyer Flasks	.50
Extra Tables	.50
GIVEN AWAY FREE	
VALUE	**16.00**

Analyzes nickel content to within 1/10th of an oz./gal.
" chlorine " " " 1/50th " " " "
" pH in terms of alkalinity " " 1/10th " a c.c./gal. of ammonia

With purchase of 6 bottles of Reagents for testing nickel solutions.

6—Bottles of Reagents @ 2.50	15.00
Packing Charge	1.00
Total Cost for Nickel Control Set	**16.00***

CYANIDE COPPER CONTROL SET

All of the apparatus furnished for the Nickel Control Sets	16.00
—plus—	
1—5 c.c. Automatic Pipette	3.00
GIVEN AWAY FREE	
VALUE	**19.00**

Analyzes copper cyanide to within 1/50th of an oz./gal.
" free sodium " " " 1/50th " " " "
" sodium carbonate " " 1/20th " " " "

With purchase of 7 bottles of Reagents for testing cyanide copper solutions.

7—Bottles @ 2.50	17.50
Packing Charge	1.00
Total Cost for Cyanide Copper Control Set	**18.50***

BRASS CONTROL SET

All of the apparatus furnished for Cyanide Copper Control Sets	19.00
—plus—	
1—50 c.c. Burette	1.60
1—Burette Clamp	.35
1—Burette Stand	.75
2—250 c.c. Beakers	.50
2—Erlenmeyer Flasks	.50
3—Glass Funnels	.60
3—Funnel Rings	1.05
100—Filter Papers	.95
Extra Tables	.50
GIVEN AWAY FREE	
VALUE	**25.80**

Analyzes copper cyanide to within 1/50th of an oz./gal.
" zinc " " " 1/50th " " " "
" free sodium " " " 1/50th " " " "
" sodium carbonate " " 1/20th " " " "

With purchase of 10 bottles of Reagents for testing Brass and Bronze solutions.

10—Bottles of Reagents @ 2.50	25.00
Packing Charge	1.00
Total Cost for Brass Control Set	**26.00***

These Sets are extremely simple to operate. No knowledge of chemistry is necessary. All calculations, even the quantities of chemicals necessary to correct the solutions, are worked out and included in the Control Sets.

*F. O. B. Brooklyn, N. Y.

**This free offer will be available only to February 28th, 1938. Because this offer is made at practically cost price, we can allow no credit terms on the original purchase. To insure prompt delivery may we ask you to please remit with your order for the Sets desired, or permit us to ship same C. O. D.

PLATERS RESEARCH COMPANY

S. C. TAORMINA
Technical Director

72 Grand Avenue
Brooklyn, N. Y.

DR. C. B. F. YOUNG
Technical Advisor

Zinc die casting alloys with a few percent aluminum, 0.03% magnesium, balance zinc.

Beryllium copper alloys; 1½ beryllium, balance copper.

Silicon-copper alloys; cheaper, more highly corrosive resistant and free from corrosion cracking. These bronzes range in composition about 95-97% copper, 1-5% silicon and about 1% manganese, tin or zinc.

The heat-treatable alloys of copper with chromium, cobalt, cadmium, tungsten, titanium, vanadium, etc., for strength and electrical conductivity.

Commercially pure copper for water tubing; corrosion resistant; ductile; easily installed.

Aluminum alloy 11-S; 5% copper, fractional percentages of lead and bismuth; for automatic screw machine work; strong and easily discards scrap, chips, etc.

Conclusion: Alloys of copper and other metals with small quantities of the rarer metals will continue to gain headway. Zinc base die casting alloys have a good future.

Question 4. What processes, new or old, for manufacturing metal products, in your opinion, have unusually good prospects for wider use in 1938?

The following processes were cited:

Improved method of casting jewelry (mentioned in answer to Question 2 above).

Die casting of magnesium alloys; also die casting of brass, for strength and economy, although the old problem here is still present—a satisfactory material for dies.

Flash and spot welding; high speed production using semi-skilled labor, with not much limit to size and shape of object.

Electric and oxy-acetylene welding in all fields.

"V" belt drives for short spans; silent operation.

Improvements in electrolytic and hot dip galvanizing should lead to wider use of galvanized products.

Hazelett process for the direct rolling of molten metal into sheets.

The continuous casting of copper by the Stout process.

The production of rod and tube directly from molten metal; Eldred process.

The manufacture of aluminum pressings.

Conclusion: The same as for Question 2. Continuous operation and the elimination of intermediate operations.

Question 5. In your opinion what types of equipment, machinery, control instruments, material and supplies, new or old, for manufacturing metal products, have unusually good prospects for wider use in 1938?

The following equipment was cited:

Steckel mill for continuous rolling of sheet metal to accurate dimensions and properties, with minimum handling; should lead to full automatic rolling processes.

Electric heating equipment.

Welding equipment.

Improved methods and wider applications of powder metallurgy—the manufacture of products from mixed metal powders.

Silver alloys for brazing and hard soldering.

Conclusions: The equipment with the most promising immediate future seems to be in the fields of electric heating, welding and machinery for continuous operation.

Questionnaire No. III-1-c-d. Technological. Sent to Electroplating Chemists, Electroplaters, Metal Polishing and Metal Finishing Experts to Judge the Electroplating, Metal Polishing and Metal Finishing Industries

Question 1. What advances were made in the knowledge of the fundamentals of electroplating, polishing and metal finishing in 1937? Please describe the advance and give the name of the individual responsible for it.

The following advances were reported.

Study of the pH of alkaline plating solutions. *R. Springer.*

Extension of the work of Springer and others on the pH of alkaline solutions. While the pH of acid plating solutions, especially nickel, is well established, little or no attention has been paid to the pH of alkaline plating solutions. It has been found that the effect of pH on cathode and anode efficiencies is very marked, and in the deposition of alloys the ratio of metals deposited is affected by the pH value of the solution. *G. B. Hogaboom.*

Removal of carbonate with gypsum. *R. O. Hull.*

Use of nitrates in silver plating baths. *Donald Wood.*

The study of the Rochelle salt-copper cyanide plating bath. *A. Kenneth Graham* and *Harold J. Read.*

Evidence that nearly all of the colors of the spectrum can be produced from a cuprous oxide bath on any metal by varying the current density and the temperature of the bath. *Dr. Jesse E. Stareck.*

Study of inclusions in electrodeposits; effect on structure, origin, etc. *Michel Cymboliste.*

The adhesion of electrodeposited nickel to nickel; good adhesion obtained by anodic treatment in sulphuric acid solution. *A. W. Hothersall.*

High speed tin plating for tinning strip steel continuously. *Macnaughtan and Prytherch.*

Corrosion resistance of electroplated coatings on non-ferrous bases. *Joint Committee of the American Electroplaters' Society, the American Society for Testing Materials, and the National Bureau of Standards.*

The steadily growing realization that protection against corrosion of the steel base of electroplated articles is dependent upon the thickness of the nickel deposited.

Conclusion: A very fruitful year, as many of these advances have been translated into technological and commercial improvement described below and in answers to Questionnaire II-1-c-d above.

Question 2. Within your knowledge, what outstanding improvements in technical control of electroplating, polishing and metal finishing operations were placed in commercial operation in 1937?

The following improvements were reported:

Chemical and heat control of cleaning solutions, resulting in much better preparation for electroplating and other finishes. Control of materials for cleaning and methods of application have been improved. The fundamentals of emulsification and saponification are still basic for this operation.

Magnetic instruments and method for measuring the thickness of electro-

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Manufacturers
of
POLISHING CEMENTS
in the
WORLD

- **Eliminates preliminary preparation and cleaning of utensils after using.**
- **No loss from spoilage.**
- **Eliminates costly control instruments, glue containers and heat for maintaining glue.**
- **Reduces cost of wheel attention, due to the elimination of glazing.**
- **Savings in labor of re-coating, due to the heat resistance of the cement.**
- **Saves adhesive and abrasive due to longer wear obtained from a heat-resisting cement set head.**
- **Consistent results under all temperature and atmospheric conditions.**
- **Reduces standing investment in polishing wheels to approximately one half the quantity required for glue.**

Customer loyalty is won by products of quality that save costs, and produce better merchandise.

Years ago, customers readily accepted our original successful substitute for glue in metal polishing, and there has been a constantly increasing use of this product ever since.

We not only appreciate the opportunity of rendering a service to the metal polishing industry in turning out a polishing cement that meets every requirement, but we also value the confidence the users have in all our materials; this is clearly indicated by the growing number of orders and our expanding sales record throughout the years.

Prompt Service
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Write for SAMPLES and
detailed Information

A Review of 1937 and a Pre-View of 1938

plated coatings; non-destructive and rapid. *A. Brenner.*

pH papers for instantaneous reading of the pH of electroplating solutions, with a range of 0.9 to 13.5.

Wider use of glass electrodes for electrometric pH measurements.

Analytical method for the control of Rochelle salt in a cuprous cyanide solution. *Dr. Louis Weisberg.*

Removal of impurities from nickel solutions with low current density. *Dr. Louis Weisberg.*

B.N.F. jet test for measurement of electrodeposited metal coatings. *Dr. S. G. Clarke.*

Control methods for cyanide copper Rochelle salt plating solutions. *A. Kenneth Graham and Harold J. Read.* Several methods have been offered. The value of each method will be tested and a standard method developed. Iron salts and compounds have an influence on the reagents and indicators used.

Time and temperature control in the baking of alkyd enamels, giving harder and more durable finishes. *Ray C. Martin.*

Conclusion: Improvement in cleaning, the purification of solutions and improved analytical methods. Important progress in the control of solutions by pH measurement, and the measurement of thickness of deposits.

Question 3. Within your knowledge, what new metal finishes were placed in commercial use in 1937?

The following finishes (non-metallic) were reported:

Modified alkyd enamels. New cellulose compounds with low flammability, flexibility and fastness to light; also great outdoor durability. Lacquer emulsion coatings which, while especially adapted for use on porous surfaces, lend themselves to metal finishing. New type of thermo-setting enamels, baked metal finishes of the urea-formaldehyde type for indoor use which approach the hardness of fused porcelain.

Chlorinated rubber finishes.

Conclusion: An active year in the development of metal finishes, especially of the synthetic resin type.

Question 4. Within your knowledge what outstanding new processes were placed in commercial operation in 1937 for electroplating, polishing and finishing metal products?

The following processes were cited:

Electrocleaning of strip steel stock. Installed by a large number of steel mills in the United States and abroad. Gives a base material for electroplating of much better character, eliminating a number of failures of finish that have previously been attributed to faulty electroplating.

Nickel plating steel strip by continuous process, including a regular sequence of handling and cold rolling, giving a finished strip of attractive appearance and high ductility.

The manufacture of fine mesh screens or perforated metal of any design by electrodeposited nickel in continuous process. Any size which is capable of photographic reproduction can be built electrolytically in solid nickel, copper etc.

The manufacture of sheet copper by electrodeposition. Deposit on rotating drums of narrow to wide strip and sheet.

A process of electroplating metal in colors, combining brilliant metallic lustre with a full range of vivid colors.

The use of tin plating as a substitute for cadmium for a cheaper and harder coating.

Conclusion: In this list, short in length, but long in vision, are several processes with far reaching possibilities. At least half of them have potentialities which were undreamed of ten years ago.

Question 5. What metal finishes, new or old, in your opinion, have unusually good prospects for wider use in 1938?

The following finishes were cited:

Hard chromium plate for use on drawing, cutting and forming tools and dies.

Phosphate pre-treatments for zinc base die castings. Baking primers on zinc for subsequent painting and other finishes. Zinc dust-zinc oxide paint for adhesion to steel and zinc surfaces and protection to steel.

Chemical black finish as an undercoat for paint or enamels.

Nickel plating in heavier coatings for improved protection against rust and corrosion; in plumbing supplies, radio, metal furniture, bicycles, etc.

Modified alkyd enamels; harder and more durable finishes. Synthetic baking enamels. Wrinkle finish baking enamels.

Conclusion: Hard chromium for protection against wear is still gaining ground. Pre-treatments for steel and zinc bases alloys as a basis for subsequent painting and other finishes are making steady headway. Synthetic resin lacquers and enamels are growing in popularity. Heavier coatings of nickel are rapidly gaining adherence throughout all industry.

Question 6. In your opinion, what processes, new or old, for electroplating, metal polishing and metal finishing, have unusually good prospects for wider use in 1938?

The following processes were named:

Vapor degreasing.

Rochelle salt-cyanide copper plating baths.

Bright nickel, copper and zinc plating solutions.

Electrolytic descaling, cleaning iron and steel prior to plating.

Heavy nickel deposits for reclaiming mis-machined parts and worn parts. Hard nickel of 400 Brinell for combined wear and corrosion resistance; soft nickel of 130 Brinell for maximum ductility of forming after deposition.

Anodic process of finishing aluminum reflectors; for permanence of reflectivity.

Better preparation, cleaning and surface finish of steel for subsequent plating; to improve and increase the ease of applying electroplates.

Conclusion: To the above should be added the list of *new* processes given in answer to Question 4, which gives us an impressive list of processes with bright prospects, and accounts to a considerable extent for the high degree of optimism reported by electroplating equipment and supply houses in answer to Question 9 of Questionnaire II-1-c-d.

Question 7. In your opinion what types of equipment, machinery, control instruments, material and supplies, new or old, for electroplating, metal polishing and metal finishing, have unusually good prospects for wider use in 1938?

The following classes of equipment and supplies were cited:

Degreasing equipment, especially of the automatic type.

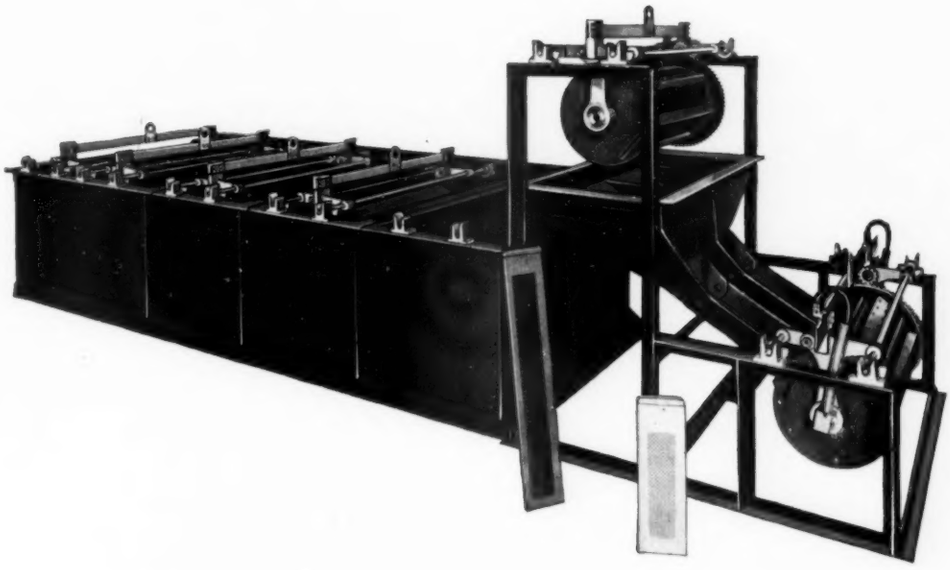
Full and semi-automatic cleaning and plating equipment for depositing copper, nickel and chromium.

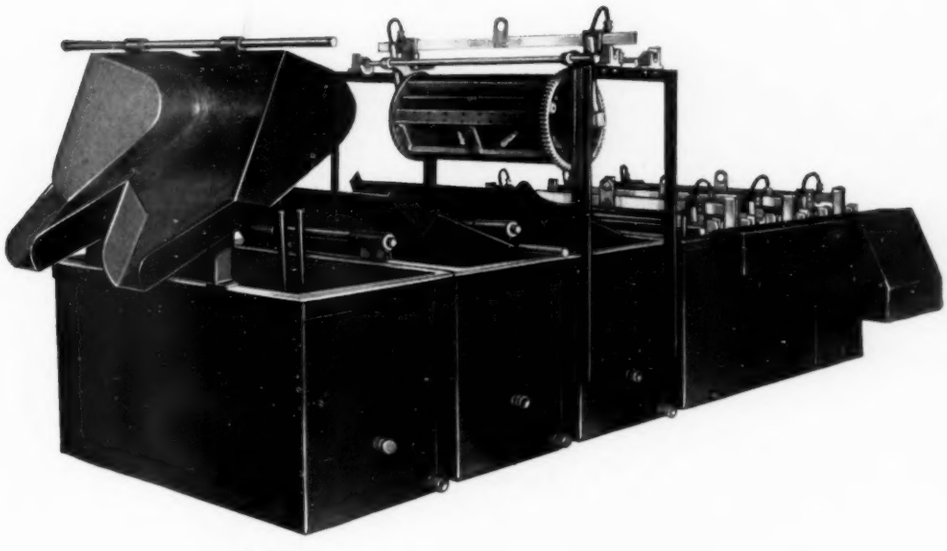
Automatic polishing equipment.

Cement instead of glue for dressing polishing wheels.

LASALCO PRESENTS

MULTIPLE CYLINDER CLEANING-PLATING-RINSING
MACHINES WITH SIMPLE STURDY HOPPER CHUTES





LASALCO Inc., 2822-38 LaSalle Street, St. Louis, Mo.

MANUFACTURERS OF SPEED PLATING EQUIPMENT

A Review of 1937 and a Pre-View of 1938

Current density meters.

Metallurgical microscopes, magnetic instruments and chemical apparatus for determining the thickness of metal deposited.

Up-to-date and efficient rheostats, ammeters, voltmeters, thermometers, analytical sets—all accessories needed for the control of solutions.

According to one report, from a prominent Western plater who visited 100 of the better plating departments throughout the country, his rating of their equipment was approximately:

Equipment rating	100%—	no plants
" "	90%— 5	"
" "	60%—35	"
" "	30%—40	"
" "	10%—20	"

"The great need of the industry as a whole is to bring its equipment up to date."

Conclusion: There, in 16 words, is the whole story. Volumes could not improve upon it. The electroplating, metal polishing and metal finishing industry is growing lustily; it is increasing its output; it is improving its output; it is developing new processes; it is spreading into new fields; it is prosperous; it looks forward with confidence to 1938 ..... but .....

"The great need of the industry as a whole is to bring its equipment up to date."

If the industry makes a good start in that direction in 1938, *it is sure to be a healthy, satisfactory—and prosperous—year.*

Acknowledgement

METAL INDUSTRY acknowledges with deep gratitude its debt to the many individuals whose ready cooperation in answering our rather detailed and lengthy questionnaires, made possible this survey. With their permission, we list those to whom thanks are due.

American Brass Co., Waterbury, Conn.

J. L. Bauer, president, North Bergen Varnish Corp., 473 Canal St., New York.

H. E. Bernard, sales manager, Magnuson Products Corp., 55-3rd St., Brooklyn, N. Y.

Dr. William Blum, National Bureau of Standards, Washington, D. C.

Campbell-Hausfeld Co., Harrison, Ohio.

Adolph Cohn of Sigmund Cohn, 44 Gold St., New York.

Crown Rheostat & Supply Co., 1908 Maypole Ave., Chicago, Ill.

M. A. Eiben, president, Northern Blower Co., 6409 Barberton Ave., Cleveland, Ohio.

Charles Engelhard, president, Baker & Co., Inc., Murray & Austin Sts., Newark, N. J.

Paul Frank, 456-4th Ave., New York.

Handy & Harman, 82 Fulton St., N. Y.

Jos. H. Hansjosten, 14685 Eastwood Ave., Detroit, Mich.

Dr. R. H. Harrington, General Electric Co., Schnectady, N. Y.

Albert Hirsch, 1945 W. Airdrie St., Philadelphia, Pa.

G. Byron Hogaboom, Jr., 352 Mulberry St., Newark, N. J.

C. M. Hoke, consulting chemist, 136 Liberty St., New York.

J. M. Howard, sales manager, Zapon Div., Atlas Powder Co., Stamford, Conn.

International Nickel Co., Inc., 67 Wall St., New York.

Ray C. Martin, 745 E. 59th St., Los Angeles, Calif.

W. S. McKeon, president, Sulphur Products Co., Greensburg, Pa.

T. F. Philippi, president, Excelsior Tool & Machine Co., Ridge Ave. 30th to 32nd St., E. St. Louis, Ill.

N. W. Pickering, president, Farrel-Birmingham Co., Inc., Ansonia, Conn.

Puritan Manufacturing Co., Waterbury, Conn.

Harold J. Roast, vice-president, Canadian Bronze Co., Ltd., 999 Delorimier Ave., Montreal, P.Q., Canada.

Joseph P. Sexton, Sargent & Co., New Haven, Conn.

Special Chemicals Corp., 30 Irving Place, New York.

H. M. St. John, chief metallurgist, Detroit Lubricator Co., Detroit, Mich.

P. W. C. Strausser, National Bureau of Standards, Washington, D. C.

George A. Stutz, president, George A. Stutz Mfg. Co., 1641 Carroll Ave., Chicago, Ill.

M. R. Thompson, National Bureau of Standards, Washington, D. C.

Vonnegut Moulder Corp., Indianapolis, Ind.

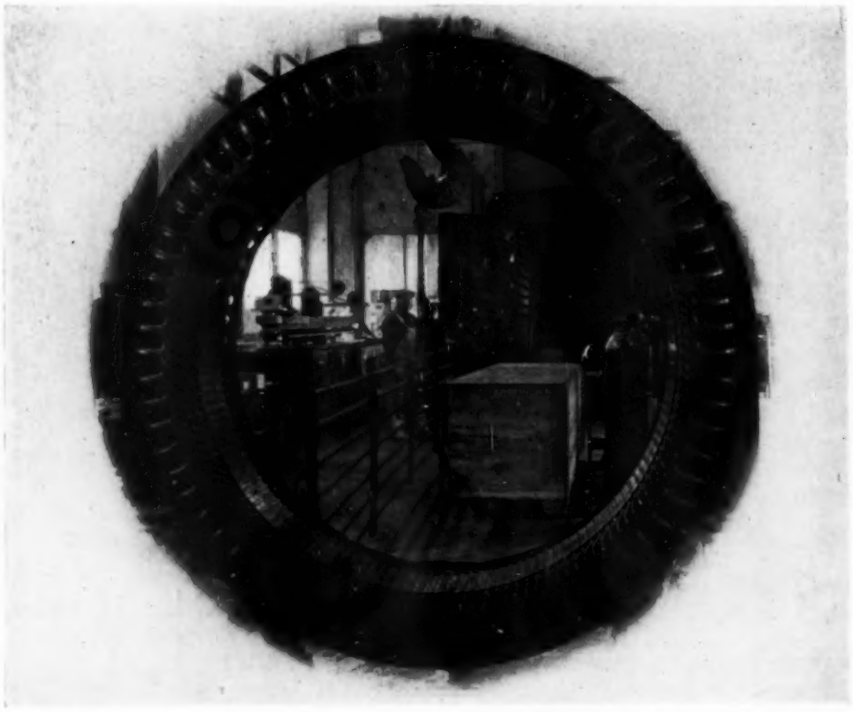
Ultrex Chemical Products Co., 255 Freeman St., Brooklyn, N. Y.

C. W. Yerger, vice-president, Hanson-Van Winkle-Munning Co., Matawan, N. J.

The Yoder Co., Cleveland, Ohio.

C. B. F. Young, Box 292, Flushing, L. I., N. Y.

In no less measure is our gratitude given to the large number who answered our questionnaires but who requested anonymity.



A "Generator's-eye" view of industry. The new electrical shop of the Hanson-Van Winkle-Munning Co., Matawan, N. J.

Apologia

We cannot close without the statement that this Survey, conscientiously as it was made, is necessarily far from being absolutely complete. It is our belief, however, that it is indicative; that it gives a representative cross-section of informed opinion.

It is our hope that by the breadth of its scope and by its attempt toward a balanced point of view, allowing room for all sides and opinions of our industry, it may help the many thousands of firms and individuals whose livelihoods depend upon it. If it has pointed out a new project or a new field or a new process, or if it has given any of our readers a new idea—"something to think about"—its purpose is fulfilled.

Threefold Superiority

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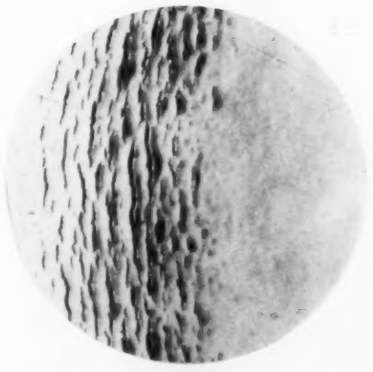
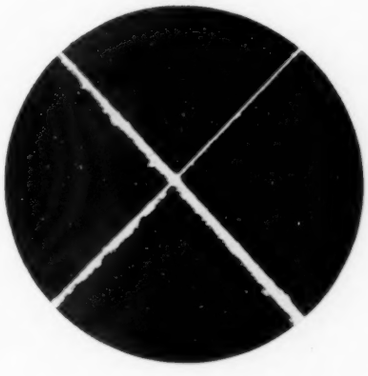
JETAL . . . simple . . . economical . . . enhances the appearance of products of iron or steel. Its lustrous, rich black finish does not alter dimensions or surface textures. JETAL is an oxide of iron and a part of the metal itself.



2. An Excellent Paint Base

JETAL is an excellent base for modern paints, lacquers and enamels. It retards rust formation . . . also allows subsequent coatings to develop their true adherence to the metal. Cut shows impact test made on enamel over JETAL. Note that the enamel film is still firmly adherent to the steel . . . is finally fractured only when the steel itself parts. In such impact tests JETAL and enamel showed 300% more adherence than enamel and steel and no breakdown after 2.000 hours in a humidity cabinet.



3. An Effective Rust-Resistant

JETALized iron or steel, dipped in our Jet-oil, stops corrosion attack for long periods of time—in laboratory tests showed no appreciable attack after 450 hours in salt spray.

The JETAL Process is known throughout the world for its effectiveness and economy. Ask for descriptive folder giving full details of the JETAL bath and its use.

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Milwaukee, the 1938 Platers' Convention City

Platers gather for 26th annual meeting from all parts of the United States. Headquarters at Hotel Schroeder.

MILWAUKEE extends a cordial invitation to all members of the American Electro-Platers' Society to attend the 1938 convention in Milwaukee from June 13 to 16. Come and enjoy Milwaukee's hospitality — a worthwhile convention—and return home refreshed with new ideas and pleasant memories.

Milwaukee is a charming city. It is nestled in a broad expanse of bay, part of Lake Michigan, one of the chain of lakes which holds half of the fresh water of the world. It has an air of genial hospitality which has made it a successful convention city.

Milwaukee traces its development as a city to the time when Solomon Juneau purchased a small trading post from his father-in-law, Jacques Vieau, representative of the Northwestern Fur Company, in an Indian village in the year 1818. Other pioneers banded together under the leadership of Juneau and were quick to capitalize on the advantages of the village's location for the development of industry and commerce.

Juneau's settlement on the lower East Side was organized as the Village of Milwaukee on Feb. 27, 1837. Byron Kilbourn's town on the West Side was established a little later. These two communities were rivals but in 1839 were consolidated as the Town of Milwaukee, each one keeping complete administration records of its own. Walker's Point on the South Side of the city, was annexed as a third ward and in 1848 Milwaukee was incorporated as a municipality and chose as its first mayor the beloved Solomon Juneau. The inhabitants at that time totaled less than 10,000.

Milwaukee, today is the metropolis of Wisconsin and the twelfth most populous city in the United States. In the last decade, its population has increased 121,000 and Milwaukee County, in its 141 square miles, has a population of 725,263.

The same spirit of hospitality and friendliness that existed in pioneering days is common today among Milwaukeeans. Today there are no signal fires, or bronzed figures, but in place of the tepees and log cabins are thousands of smoke stacks of industry and many buildings towering into the sky with flags unfurled, symbolizing a great city with a great spirit.

Milwaukee is the ninth city in the United States in the value of manufactured products, a fact due in large part to the great diversity of industry and its favorable location in relation to transportation, markets and sources of supply.

Milwaukee leads the world in the manufacture of silk hosiery, automobile parts, heavy pumping machinery, large gas engines, heavy lubricating equipment, steam shovels, dredges, refrigerating, saw-mill and cement machinery, hydro-electric units and elec-

Hotel Schroeder, Convention Headquarters

Milwaukee City Hall

M&W CAN HELP YOU SPEED UP PRODUCTION

Maas & Waldstein have helped many manufacturers to speed up production and reduce finishing costs per unit by suggesting improvements in finishes and finishing processes. Here, for example, are some of the changes that have been recommended to increase manufacturing profits:

Substitute air-drying for baking schedules.

Use enamels baking in less than 30 minutes in place of those requiring several hours.

Replace primers that must dry over night with those that dry in a few hours.

Use multi-coat systems that can be baked in one operation instead of systems requiring two or more bakes.

M&W has been serving manufacturers of products of every description for over 60 years. Its experience in the industrial finishing field is unsurpassed, and it is a leader in developing finishes that are fitted to special production requirements. M&W field representatives are expert finishers and can give users of industrial finishes practical assistance in improving their finishing processes.

We invite an opportunity to discuss your finishing problems with you.

Maas and Waldstein Company · Newark · N. J.

Branch Offices and Warehouses . . . 1336 Washington Blvd., Chicago . . . 1228 W. Pico Blvd., Los Angeles

LACQUERS **PIONEERS IN PROTECTION** ENAMELS

AUSTIN B. WILSON
President, A.E.S.

FRANKLYN J. MAC STOKER
1st Vice-president, A.E.S.

R. M. GOODSELL
2nd Vice-president, A.E.S.

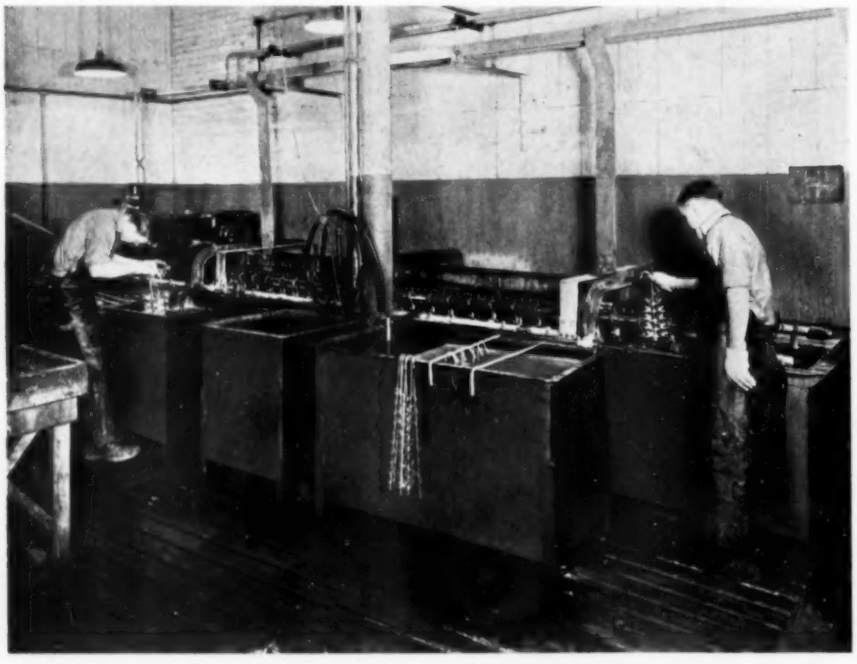
trical control apparatus, rock crushers and wheelbarrows.

Milwaukee has produced the largest ore crusher; the largest hydro-electric unit, the largest heat treating furnaces, the largest mining hoists, concrete mixers, water turbines, grey iron castings and the largest gas and Diesel engines in the United States. With the repeal of Prohibition Milwaukee again took its place as a leading producer of malt and malt products.

Even with the great activity and industrial progress which Milwaukee has maintained, the Milwaukee river flowing through the heart of the business district gives to the city a graceful charm. Milwaukee has many parks and playgrounds scattered throughout the city covering an area of more than 1,500 acres. These parks offer a variety of interesting scenery and recreation. The city is also circled by a park development plan which follows the lake shore and courses of the rivers. Milwaukee's harbor has many times been called "the Naples of America". It is an impressive view, best seen from the Lincoln Memorial bridge and drive which extends along the lakeshore for miles through parks and ravines.

Milwaukee is essentially an American city. It is a city of homes and home-loving people. Beautiful residential districts in all parts of the city bear evidence to this fact. Milwaukee is proud of being the healthiest and safest city in the United States. Here there is less waste of life and health than any other city of its size, and also, is there less waste due to fire loss. Milwaukee has many times been awarded honors in national contests conducted by the National Chamber of Commerce.

Today, this great metropolis invites visitors as did the friendly braves of the Indian village of long ago to sit by her council fires and smoke the pipe of peace—to enjoy the hospitality of this friendly city.

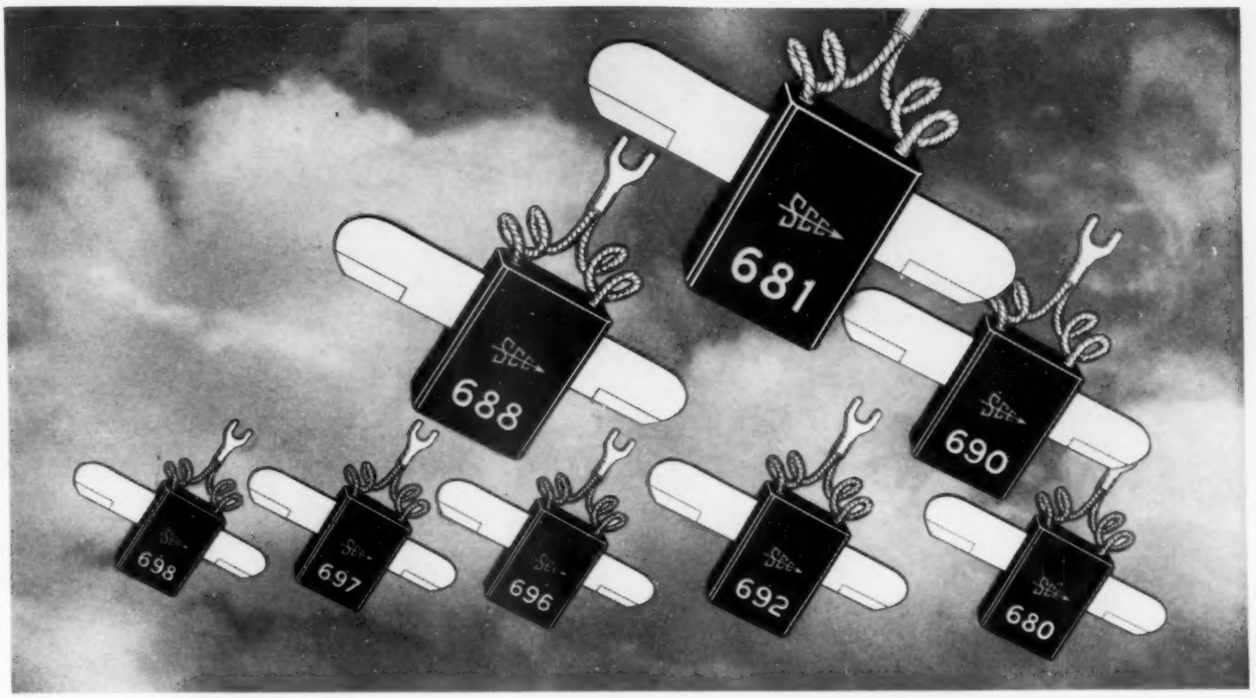


Semi-automatic cadmium plating unit, Cutler Hammer Co., Milwaukee, Wis.

Convention Committees

A convention, as everyone knows, is an enormous job to prepare for and to manage. To the Convention Committee of the Milwauke Branch, therefore, all credit is due for the efficiency with which they planned the 1938 convention and the completeness of the arrangements which they made. These committees were lead by the following chairmen:

R. M. Goodsell, General Chairman
A. J. Hermansen, secretary
Robert Steuernagel, treasurer
Vincent Sheehan, Educational Committee



ONE MUST LEAD

Out of hundreds of grades of brushes produced by SPEER, about two-score provide sufficient choice to meet practically every requirement of motor, generator, and rotary converter operation. Of this group, the eight SPEER 600-Series metal-graphite brushes will show outstanding performance on plating generators under all but the most unusual conditions. This single Series of SPEER Brushes has amply demonstrated its superiority in service. It is easily the leader of the whole field by virtue of service records and user-testimony.

For technical detail regarding all SPEER Brushes, ask for new data bulletin number 40.

8829

AUSTIN FLETCHER
3rd Vice-president, A.E.S.

Phil. J. Ritzenthaler, General Program Committee
Dexter Rhodes, Registration Committee
Jack Geissman, Entertainment and Recreation Committee
Frank J. Marx, Banquet Committee
Irving Herrmann, Hotel & Reservations Committee
Jos. Bykowski, Transportation Committee
Robert Goodsell, Publicity Committee
John Miszewski, Jr., Shop Visitation Committee
Harry Bornitzke, Exhibits Committee
Dan Wittig, Advisory Committee
Mrs. Jack Geissman, Chairman Ladies' Committee

Ladies' Committee

Mrs. Jack Geissman, General Chairman.

COMMITTEE CHAIRMEN

Mrs. Robert Steuernagel
Mrs. R. M. Goodsell
Mrs. Al Hermansen
Mrs. Dexter Rhodes
Mrs. Phil Ritzenthaler
Mrs. William Geissman
Mrs. Roman Lipinsky
Mrs. Jos. Bykowski
Mrs. Dan Wittig
Mrs. Frank Marx
Mrs. M. McGuire
Mrs. Henry Bornitzke
Mrs. Harry Unke
Mrs. Robert Steuernagel, Jr.
Mrs. Rodney Olson
Mrs. Robert Goodsell

Complete Program of the 26th Annual Convention of the A. E. S.

Sunday Afternoon, June 12th

2:00 P. M. Final Meeting of Committee Chairmen.

3:00 P. M. REGISTRATION, Hotel Schroeder.

Registration fees: Men $6, Ladies $4, which entitles registrant to Book of Tickets to be used for all functions and activities. Membership in Society is not necessary for registration.

Monday Morning, June 13th

8:00 A. M. REGISTRATION, Hotel Schroeder.

W. J. R. KENNEDY
Executive Secretary, A.E.S.

9:00 A. M. WELCOME TO DELEGATES, MEMBERS, and VISITORS—

R. M. Goodsell, General Chairman.

WELCOME TO MILWAUKEE

Mayor Daniel Hoan or his representative.

PRESIDENTIAL ADDRESS

Pres. A. B. Wilson

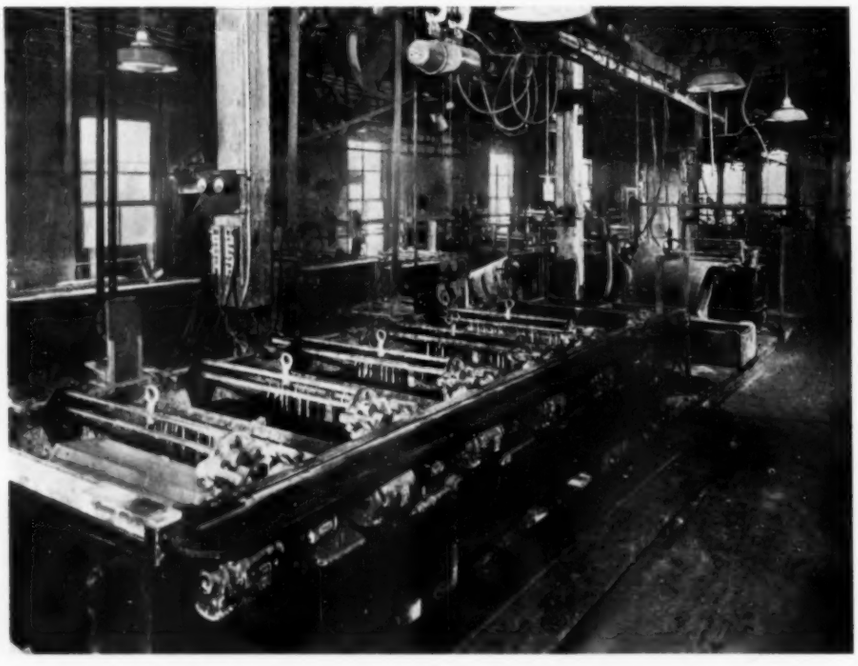
BUSINESS SESSION

Presentation of Credentials.
Submission of Amendments to Constitution.

Monday Afternoon, June 13th

1:30 P. M. EDUCATIONAL SESSION

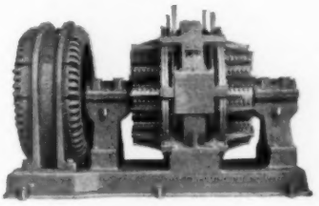
Chairman—*George B. Hogaboom,*



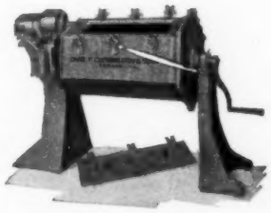
Barrel plating department, National Plating Co., Milwaukee, Wis.

40TH ANNIVERSARY

Reliance Butler Finish a Greaseless Compound for Satin or Butler Finish



Reliance Generators
For
Efficiency and Dependability
75 to 10,000 Amperes



Type "G"
Tumbling Bbl.

Portable
Plating Bbl.

Type "C"
Reliance Rheostat

Chas. F. L'Hommedieu & Sons Co.

MANUFACTURERS of
Plating and Polishing Machinery and Supplies

Cleveland
1601 St. Clair Ave.

General Office & Factory
4521 Ogden Ave.
CHICAGO

Los Angeles
6060 Ferguson Drive

A. J. HERMANSEN
Secretary, Convention Committee

ROBERT STEUERNAGEL
Treasurer, Convention Committee

VINCENT SHEEHAN
Chairman, Educational Comm ttee

Hanson-Van Winkle-Munning Co.

1. Summary of Research on Electrodeposition at the National Bureau of Standards. *Dr. Wm. Blum*, Nat'l. Bureau of Standards.
2. Preparation of Specimens for Exposure Tests. *P. W. C. Strausser*, Research Associate of the A. E. S. at the Nat'l. Bureau of Standards.
3. Primary Current Distribution in Electrodeposition in Linear Cylindrical and Spherical Conductors. *C. Kasper*, National Bureau of Standards.
4. Survey of Metal Cleaning. *Dayton Branch.*
5. Advancements in Electroplating in a Lifetime. Boston Branch, *Bert Sage*, A. S. Campbell Co.
6. Practical Demonstration of What Happens in a Plating Barrel. *Dr. Burton G. Daw*, Lasalco, Inc., St. Louis.

Monday Evening, June 13th

8:30 P. M. INTERNATIONAL FELLOWSHIP CLUB—OPEN HOUSE.
Crystal Ball Room—Hotel Schroeder.

This night will be devoted to a party for men and ladies sponsored by THE INTERNATIONAL FELLOWSHIP CLUB.

We look forward to the pleasure of entertaining you.

We welcome you as our guest. A ticket is included in the Book of Tickets which must be used for admittance to this affair.

A NIGHT OF ENTERTAINMENT
DANCING— BUFFET LUNCH
REFRESHMENTS

Tuesday Morning, June 14th

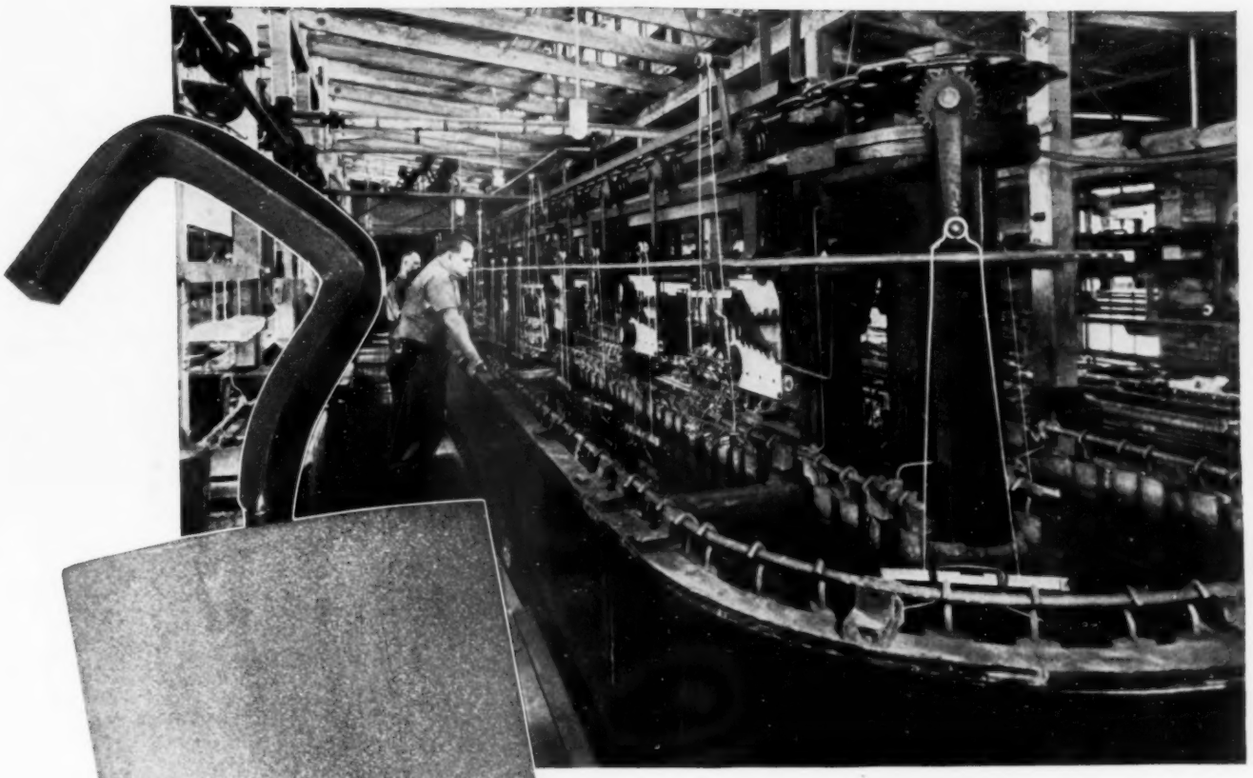
8:30 A. M. EDUCATIONAL SESSION
Chairman—*W. M. Phillips*, General Motors Corp.

1. Physical Properties and Uses of Heavy Nickel Deposits. *W. A. Wesley*, International Nickel Co.
2. Bright Nickel. *G. Soderberg*, Technical Director, The Udylite Co.

PHIL J. RITZENTHALER
Chairman, Program Committee

DEXTER RHODES
Chairman, Registration Committee

JACK GEISSMAN
Chairman, Entertainment Committee



RECOMMENDED TO ALL PLANTS

Where Quality Counts

Seymour Anodes are made of virgin nickel cast in an electric furnace under strict pyrometric control of grain structure.

The result is an anode that will corrode evenly throughout its entire life without excess "sludge," and yield a good, ductile plate.

Seymour Nickel Anodes are available in all standard shapes from stock, and in special shapes cast to your patterns. The line also includes copper, brass, bronze and zinc anodes.

Catalog on Request

THE SEYMOUR MANUFACTURING CO.
70 Franklin St. Seymour, Conn.

Ask For Information About SEYMOUR BRIGHT NICKEL & "SEYCAST" BRIGHT NICKEL ANODES

SEYMOUR CONTROLLED GRAIN

NICKEL ANODES

FRANK J. MARX
Chairman, Banquet Committee

IRVING M. HERRMAN
Chairman, Hotel Committee

JOSEPH C. BYKOWSKI
Chairman, Transportation Committee

3. Importance of Correct Anode Corrosion in Nickel Plating. *W. Pinner and E. Borchardt*, General Spring & Bumper Co.
4. Investigations in Bright Zinc. New York Branch, *Dr. C. B. F. Young*, Columbia University.

Tuesday Afternoon, June 14th

12.30 P. M. Board Cars for Waukesha Beach. Picnic Cars leave promptly at T. M. E. R. & L. Bldg., 2nd and Michigan Streets.

1:30 P. M. Dinner—Waukesha Beach Dining Room.

2:30 P. M. Ball Game—East vs. West.

5:30 P. M. Cars leave for Milwaukee.

Tuesday Evening, June 14th

8:30 P. M. EDUCATIONAL SESSION

Chairman—*T. F. Slattery*, U. S. Bureau of Engraving & Printing.

1. Answers to 101 Questions on Copper Plating. *Springfield Branch.*
2. The Effects of Metallic Impurities on the Structure of Cyanide Copper Deposits. *Dr. Walter R. Meyer*, Electro-Chemist, General Electric Co.
3. High Speed—High Temperature Copper Plating Solutions. *Floyd Oplinger*, E. I. DuPont De Nemours & Co.
4. Cyanide Copper Bath—Rochelle Salt. *Robert M. Wagner*, Guide Lamp Div., General Motors Corp.

Wednesday Morning, June 15th

8:30 A. M. PLANT VISITATION

1. National Plating Co., 325 N. 8th Street.
2. S. K. Williams Co., 2370 N. 32 Street.
3. Cutler-Hammer Inc., 13th & St. Paul Avenue.

Wednesday Afternoon, June 15th

1:30 P. M. EDUCATIONAL SESSION

Chairman—*Dr. Wm. Blum*, National Bureau of Standards.

1. Dips and Their Uses in the Plating Cycle. *Hartford Branch.*
2. Metal Coloring. *George B. Hogaboom*, Hanson-Van Winkle-Munning Co.
3. Effect of Carbonate and Sulphate on Cyanide Plating Solutions. *R. O. Hull*, Grasselli Chemical Co.
4. Electroplating Solves Manufacturing Problems. Detroit Branch, *J. H. Hoefer*, A. T. Wagner Co.

ROBERT GOODSELL
Chairman, Publicity Committee

JOHN MISZEWSKI, JR.
Chairman, Shop Visitations Committee

HENRY BORNITZKE
Chairman, Exhibits Committee

SIGNPOSTS . . .

IN PLATING PROGRESS!

WITH the development of a commercially practical method of chromium plating, new and almost limitless opportunities for expansion were opened in the field of electroplating . . . and the product-improving advantages of a superior finish were made available to Manufacturers. United Chromium is proud of its contribution to the plating industry in the chromium plating field.

Now, with the announcement of Electrocolor,* once more the frontiers of growth and opportunity are extended. This company is glad to be able to sponsor and develop the new process that now makes color readily available by plating on metal articles.

United Chromium's cooperation and engineering service are made available to hundreds of licencees, in connection with both chromium plating and Electrocolor*.

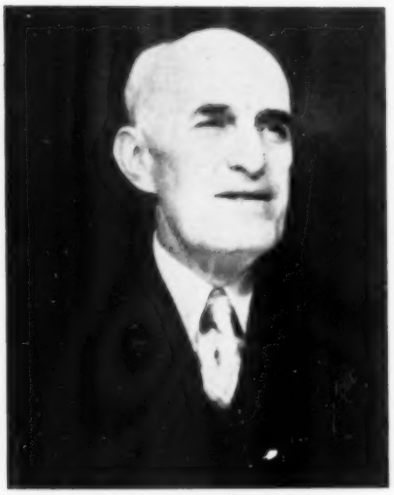
UNITED CHROMIUM

INCORPORATED

Executive Offices:
51 East 42nd Street
New York City

DETROIT
SAN FRANCISCO
WATERBURY

*Electrocolor is a trademark registered in the United States Patent Office covering articles colored by our Process.



DAN WITTIG
Chairman, Advisory Committee

Wednesday Evening, June 15th

8:00 P. M. EDUCATIONAL SESSION

Chairman—*Oscar Servis*, Felton & Tarrant Co.

1. Wetting Agents in Plating Solutions. *Newark Branch.*
2. Industrial Finish Manufacture. *E. Bucy*, Zapon-Brevolite Div., Atlas Powder Co.
3. Use of Solvent Emulsions in Cleaning. *Dr. Mitchell*, Magnus Chemical Co.
4. Fume Exhaust Design. Toronto Branch, *H. A. Smith*, Coulter Copper & Brass Co.
5. Practical Solution Maintenance. Philadelphia Branch, *Frederick Fulforth.*
6. Matt and Bright Dipping. *Waterbury Branch.*

Thursday Morning, June 16th

8:00 A. M. SPECIAL BUSINESS SESSION

Constitutional Revision.

Thursday Afternoon, June 16th

1:30 P. M. FINAL BUSINESS SESSION

Election of Officers.
Selection of Convention City.

Thursday Evening, June 16th

6:30 P. M. BANQUET AND DANCE

Hotel Schroeder Ball Room.
Entertainment. Fun for all.

Exhibits

A complete list of the Branches and companies who will present exhibits.

Chicago Branch

C. G. Conn Ltd., Elkhart, Ind.
McGill Mfg. Co., Valparaiso, Ind.
Katzinger Company, Chicago, Ill.
Gilbertson & Son, Chicago, Ill.
Apollo Metal Works, Chicago, Ill.

Toledo Branch

Hale Chrome Products Company
Acme Specialty Mfg. Company
DiSalle Plating Company
DeVilbiss Company
Gordon Bumper Company
Shaaf & Goode Company
Air-Way Company
Jas. E. Nagle & Sons, Inc.
Moore Chrome Products Company

MRS. JACK GEISSMAN
Chairman, Ladies Committee

Hinkle-Clause Company
Gerity Adrian Corp.
Dura Company

Grand Rapids Branch

Zeeland Ornamental Company, Zeeland, Michigan.
Keeler Brass Company, Grand Rapids, Michigan.
Shakespeare Company, Kalamazoo, Michigan.
American Brass Goods, Grand Rapids, Michigan.
Grand Rapids Store Equipment Company, Grand Rapids, Michigan.
Grand Rapids Metal Craft Corporation, Grand Rapids Michigan.
C. L. Frost & Son Company, Grand Rapids, Michigan.

PAUL M. SAVAGE
Chairman, International Fellowship Club

T. A. TRUMBOUR
Secretary-Treasurer, International Fellowship Club

OLIVER J. SIZELOVE
Vice-chairman, International Fellowship Club

MASTER FOLD

THE NEW UDYLITE BUFF WHICH GIVES 25% TO 75% GREATER PERFORMANCE!

The Masterfold is a new, radically different buff designed to give 25 per cent to 75 per cent better buffing performance in terms of faster cutting, longer buff life and greater buffing economy. • The Masterfold is an exceptionally fast, smooth cutting buff which produces a high lustre in a minimum of time. It is a rugged buff built to stand up under hard usage. • Masterfold buffs can be used on both automatic and hand operated equipment to buff all metals. • Send for your copy of our descriptive bulletin which gives full details.

★ More pieces per hour

The Masterfold is an exceptionally fast cutting buff. It literally bites into the metal with a minimum of pressure and will reduce buffing time anywhere from 25 per cent to 75 per cent.

★ More pieces per wheel

The Masterfold buff is designed for modern production requirements and will stand up under hard usage. It absolutely will not burn as the "open face" construction permits free air circulation between the cloth ply.

★ Gives a better finish

Not only does the Masterfold do faster buffing, but it produces a better finish on the work. It cuts evenly, smoothly, quickly. The buffing action is uniform over the entire face of the wheel.

★ Economical to use

The Masterfold is an economical, money-saving buff from every viewpoint. It is a fast, speedy cutting buff; stands up remarkably well; gives an excellent finished surface; holds and pockets composition.

★ Operators like them

The man on the wheel goes for Masterfold buffs because they are easy to use. He lets the buff do the work and gets the results he wants—fast cut, high finish—with a minimum of pressure.

THE UDYLITE COMPANY

1651 E. Grand Blvd. • DETROIT, MICHIGAN

NEW YORK	CHICAGO	CLEVELAND	SAN FRANCISCO
30 East 42nd Street	1943 Walnut Avenue	3856 Carnegie Avenue	114 Sansome Street

W. B. Jarvis Company, Grand Rapids, Michigan.
Grand Haven Novelty Company, Grand Haven, Michigan.
Knapt & Vogt Mfg. Company, Grand Rapids, Michigan.
Hart & Cooley Mfg. Company, Holland, Michigan.

Cleveland Branch

The Republic Steel Corp., Cleveland, Ohio.
The National Screw & Manufacturing Company, Cleveland, Ohio.

St. Louis Branch

Knapp-Monarch Company, St Louis, Missouri.

Buffalo Branch

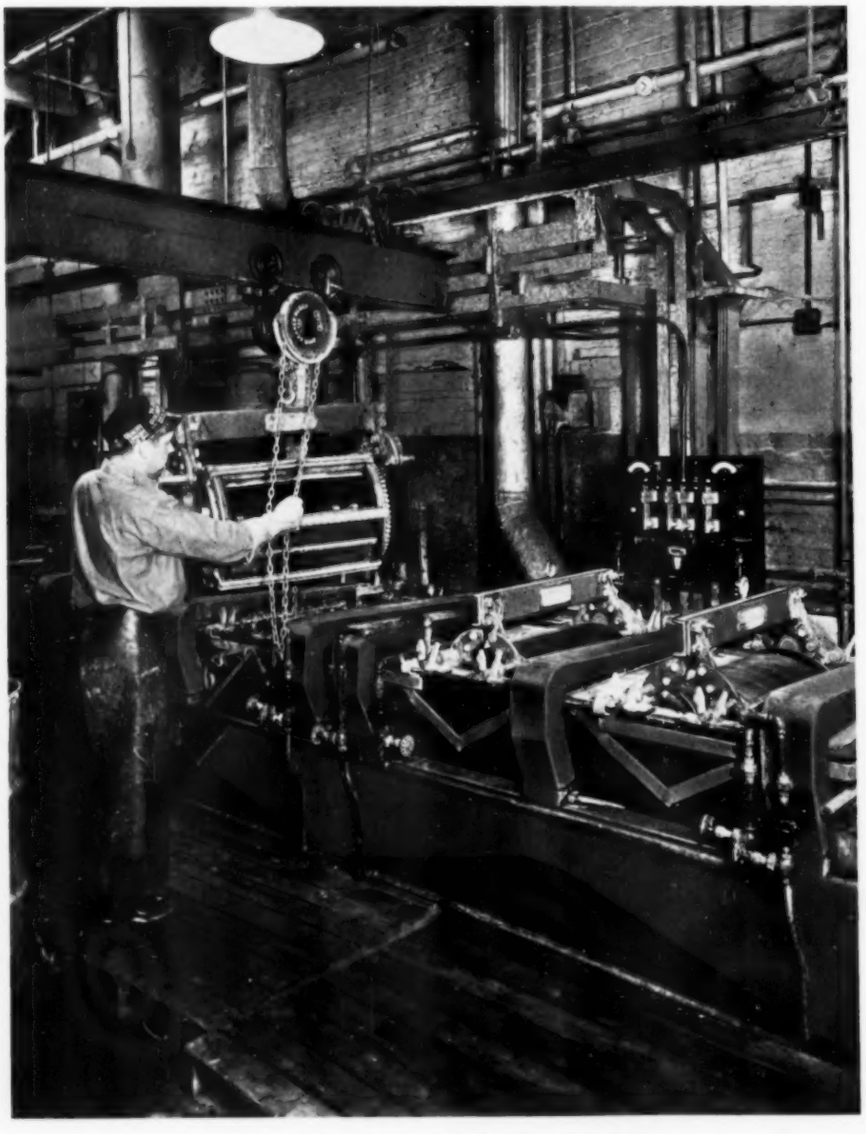
Trico Products Company, Buffalo, N. Y.
J. H. Williams & Company, Buffalo, N. Y.
Barcals Mfg. Company, Buffalo, N. Y.
Spencer Lens Company, Buffalo, N. Y.
Rudolph Wurlitzer, Tonawanda, N. Y.
Geo. A. Ray Mfg. Company, Buffalo, N. Y.

Milwaukee Branch

Milwaukee Stamping Company, Milwaukee, Wisconsin.
Kohler Plumbing Company, Kohler, Wisconsin.
Cutler-Hammer Inc., Milwaukee, Wisconsin.
Racine Plating Company, Racine, Wisconsin.
Moe-Bridges Lamp Company, Milwaukee, Wisconsin.

Other Branches

Anderson Branch
Detroit Branch
Los Angeles Branch
Newark Branch
New York Branch
Toronto Branch



Barrel plating at the Cutler Hammer Plant, Milwaukee, Wis.

Ladies' Program

Sunday, June 12th

2:30 P. M. REGISTRATION

Monday, June 13th

MORNING—OPEN

AFTERNOON—A Tour of Milwaukee and its points of interest.
EVENING — Accompanying the men as guests of the International Fellowship Club Party.

Tuesday, June 14th

MORNING—OPEN
AFTERNOON—Accompanying the men to the picnic to be held at Waukesha Beach.
EVENING—Card Party at 8:30 P. M.

Wednesday, June 15th

MORNING—OPEN
AFTERNOON—A visit to the Phoenix Hosiery Co.
EVENING—Theatre Party.

Thursday, June 16th

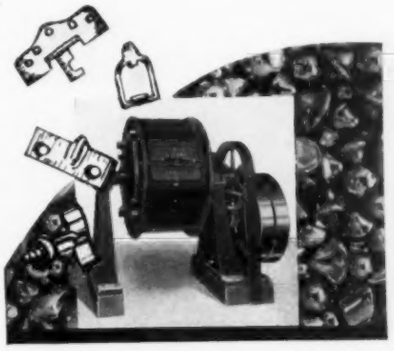
MORNING—OPEN
AFTERNOON—Party sponsored by the International Fellowship Club.
EVENING—Accompanying the men to the Banquet.

International Fellowship Club

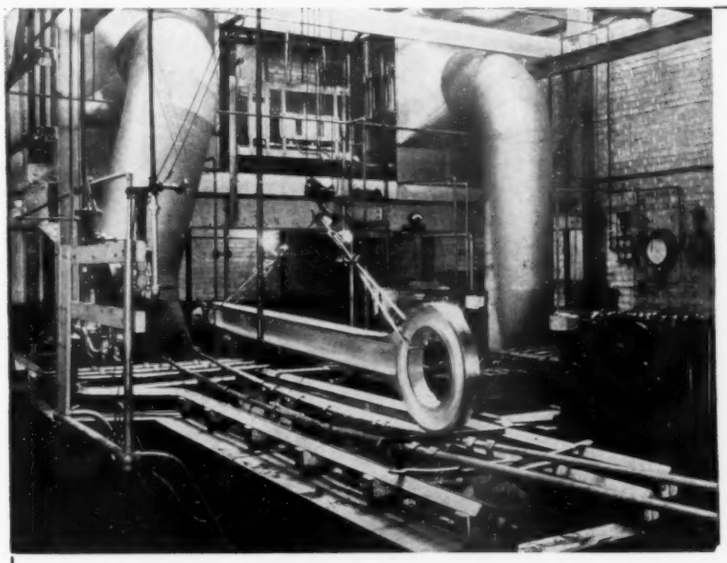
The International Fellowship Club, will, as usual, hold a full schedule of meetings during the convention. On Monday noon June 13th, the Annual Luncheon will be held at the Hotel Schroeder. All men interested in electroplating equipment and supplies are

when he's a foreman plater

He'll find his job made easier by Abbott Ball Burnishing. This method of finishing small metal parts will help him get production loads thru on time. He'll rely on it for a uniform finish on pecks of work at a load. His department will maintain low cost standards that will put him in solid with management. But that will be twenty years from now. You don't have to wait that long to cash in on all the advantages offered by Abbott Burnishing Barrels and Burnishing Materials. We'll help you in connection with any burnishing problem. Perhaps you have some type of barrel and are not getting the results you want. Or you may have a new product that you think is adapted to burnishing. In either case tell us about it. Send samples. We'll have our Experimental Department go to work on them and send you a complete report with recommendations. And when it's time to order burnishing balls, cones, pins, or slugs, remember: you're sure of prompt shipment from Abbott's large stock of quality materials.



The Abbott Ball Company
1046 New Britain Avenue
Hartford Connecticut



The front half of the main driving rod for the New York Central Railroads "Commodore Vanderbilt" receiving a chromium finish in a Knight-Ware Slab lined steel tank. Courtesy of the Timken Roller Bearing Co.

TANKS and LININGS for

CHROME and NICKEL PLATING METALS PICKLING or CLEANING ACID STORAGE

Knight-Ware is an acid-proof material; not just resistant. It is hard, durable and easy to clean and keep clean. It is also an excellent dielectric.

Quotations or further information gladly furnished upon specific requests.

MAURICE A. KNIGHT KNIGHT-WARE **BOX 111, AKRON, OHIO**

Full information about hotels and reservations will be found on page 314.

invited to be present. On Monday evening, June 13th, the Annual Open House, given by the Fellowship Club will be held at the Hotel Schroeder. All registrants at the convention are invited. On Thursday afternoon at the Schroeder Hotel will be held a party for the ladies, consisting of games and other entertainment. Prizes will be awarded.

Milwaukee Public Museum and Library

Arrangements have been made for any of the registrants who may be interested, to play golf at any time during the convention week. For information communicate with Tom Trumbour at the convention.

Milwaukee's financial district

METSO* CUTS PLATING OPERATION IN HALF!

ARE YOU LOOKING for ways to save money in cleaning metals? Profit from the experience of a large metal working plant. The plating department compared the performance of various cleaners, including Metso. Metso outranked all so completely, that the cleaning sequence was reduced from ten operations to five. Complaints were almost eliminated.

The proper balance of efficient alkali and silica content in Metso insures improved performance and saving. Get in touch with us about a simple test that won't interrupt your production schedule.

* Metso was developed by our laboratories and is the original free flowing sodium metasilicate. For uniform, dependable quality, order Metso, made by the Philadelphia Quartz Co.

SODIUM METASILICATE
U. S. Patent 1898707

ESTABLISHED 1831

PHILADELPHIA QUARTZ CO.

General Offices and Laboratory: 125 S. Third St., Phila., Pa.
Chicago Sales Office: 205 W. Wacker Drive. Stocks in 60 cities.
Sold in Canada by NATIONAL SILICATES LTD., Toronto, Ont.

METSO CLEANERS

H-VW-M News

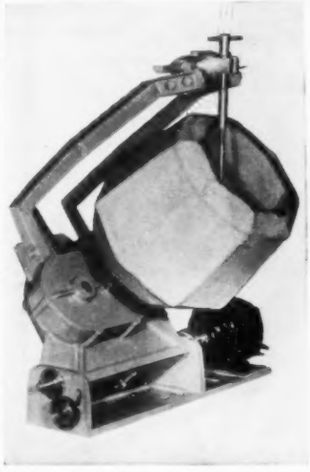
Prepared by HANSON-VAN WINKLE-MUNNING CO.

FEBRUARY, 1938 · MATAWAN, N. J. · Page 1

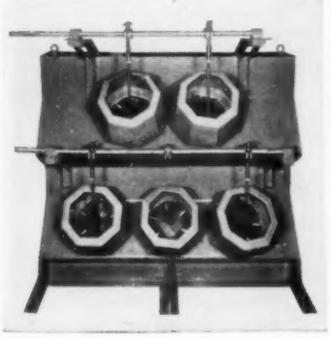
New Mercil Type Oblique Plating Units

The accompanying views show Mercil Type Oblique Plating Apparatus which has attracted considerable attention and offers many advantages.

The Single Oblique Unit consists of a cast iron base on which is



mounted a 1/4 H.P. motor. The motor shaft runs through to the opposite side of the apparatus and extends about 2" from the outside housing casting. In the event a second unit is required, it is not necessary to use another motor, but



connection may be made to the coupling of the first unit. This unit is adjustable as to the working position and is controlled by the hand wheel which operates in a radius slot so the apparatus can be tilted to any angle desired.

Another advantage is that this unit can be operated at different speeds. Directly under the cylinder is a change gear case, and to vary speed it is simply a matter of lifting cylinder off the drive shaft, loosening six flat head screws shown on the plate directly under the cylinder, removing top plate and changing the gears which are equipped with slip bushings. The normal speed of this cylinder is approximately 6 R.P.M. but by reversing the gears inside of the case a speed of from 10 to 12 and 32 to 34 R.P.M. can be obtained.

The cylinder used is octagon steel with tapered sides, rubber covered with 1/8" rubber both inside and outside. This cylinder is 13" deep with 9" opening at top and 10" across bottom inside.

The weight of cylinder is twenty seven pounds. Total weight of cylinder, solution and work is about thirty seven pounds. It holds about two, or two and one half gallons of solution and the loads depend on class of work to be plated, but from three to ten pounds can be handled per load.

The anode is hung from the anode rod and is easily removed when cylinder load is plated, then the cylinder lifted and contents dumped in a container that has a screen separator to catch the finished work. Anodes about 4-1/2" wide by 7" long can be used in this cylinder and if desired small baskets for ball anodes may be substituted.

The second illustration shows a 5 cylinder unit recently built for Western Electric Company, Chicago, Ill. This outfit is driven by a 1/2 H.P. motor 1200 R.P.M. giving the cylinder a speed of approximately 5 R.P.M. The motor is direct connected to a Boston Reducer and from the slow speed shaft of this reducer it is connected with mitre gears to the main shaft of the Mercil type reducers. The power is transferred by means of sprocket and chain to the upper bank of two cylinders. Apparatus of this type has been built with as many as fifteen cylinders.

Compositions Developed For Use On Plastics

During the past few years H-VW-M has developed a complete line of cutting-down and coloring compositions particularly adaptable for plastics with special attention given to the elimination of "dragging", or drag marks, on the surface of the molded part.

Also, compounds have been introduced for the purpose of producing a brilliant surface lustre with a minimum of effort. Thorough attention has been given, in producing these products, to the elimination of glazing on the surface of the buff face.

Complete information will be furnished to any who may have problems in the finishing of molded plastic parts.

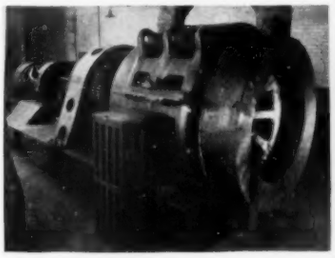
Bethlehem Steel's Electrogalvanized Wire Attracts Unusual Attention

Electrical World Article First Told Story

40,000 AMP. HOMOPOLAR GENERATOR USED

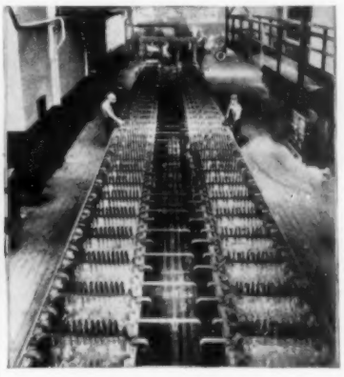
In the June 19, 1937 issue of Electrical World the new method of "Bethanizing" zinc on steel wire by electroplating was released to the public in an article headed "Electrogalvanized Wire Gives Corrosion Defiance" and jointly written by W. C. Frank and W. E. Miller, Chief Engineer and Superintendent Maintenance Department respectively, of the Cambria Plant of the Bethlehem Steel Company, Johnstown, Pa.

Quotations from this article tell an unusual story of a new process of *continuous* electroplating: "Duct-



Homopolar Generator is supply for Electrodeposition Current.

ility, Bond and Toughness obtained with high purity coating" — "There are many technical innovations in the production process" — "it proves that electricity is more and more frequently the means by which a good product is made a lot better" — "it proves the frequent assertion that industry has hardly begun to use amperes and watts."



Bethanizing is done in this 110-ft. cell.

The article points out that electroplating zinc on fence wire, suspension strand and guy wires, is in practical operation in large tonnage and that the development of cleaning and plating baths has resulted in a commercially practical process that is even faster than the former hot dip practice. The mechanical bond is so firm and the ductility of the zinc so high that bending and forming or drawing-down does not impair the protective coating.

Among the several photographs shown with this article are two reproduced herewith—one showing the 110 foot cell where the "Bethanizing" is done and the other showing the H-VW-M Homopolar Generator which is the supply for the electrodeposition current. This generator is rated 12 volts and 40,000 amperes. It has ventilator shields and ducts, and there is also shown the inclosure of the heavy bus feed which passes under the floor to the bus running longitudinally between the two electrodeposition baths. Approximately 40 tons of copper was used to complete the bus system. The generator is operated by a synchronous motor.

Plate Rectifier Attracts Attention at Chemical Show

On display at the Sixteenth Exposition of Chemical Industries in New York City during December was a H-VW-M copper oxide plate rectifier in the booth of the Westinghouse Electric and Manufacturing Company.

The installation received considerable comment and many marvelled at this simple method of converting alternating current into direct current in so small a cabinet without any moving parts except a small fan. Engineers and production men were also interested in the main features of elimination of replacements and low maintenance costs; the freedom from initial installation costs; and the high overall efficiency and power factor.

NEW!

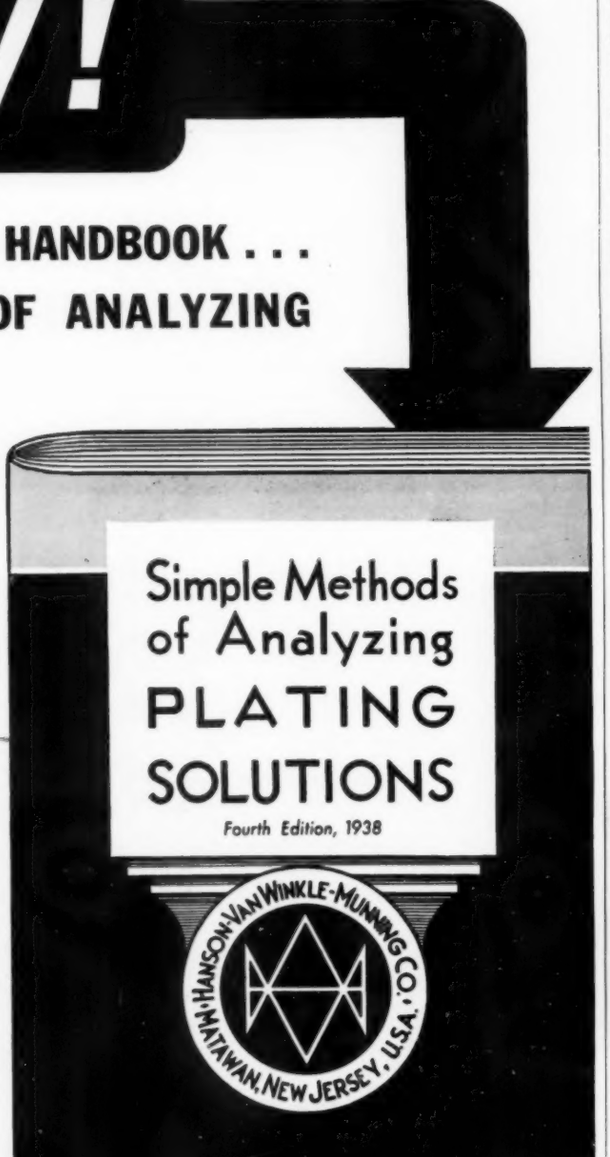
FOURTH EDITION OF HANDBOOK . . . SIMPLE METHODS OF ANALYZING PLATING SOLUTIONS

Here is a handbook of value in every establishment doing plating. It gives complete information on plating control through chemical analysis and explains how to get consistent results in production by keeping solutions at constant value.

Properly arranged and simply written so that the average plater without special chemical education can understand his problems — complete enough, with comprehensive coverage of solutions and accompanying tables, to be of value to the chemically trained expert.

Thousands of copies of past editions of this handbook have been distributed upon request — the new fourth edition containing many additions of new solutions and tables will be out this month.

Write for your FREE copy.



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MATAWAN, NEW JERSEY

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SALES OFFICES: Chicago · Cleveland · Detroit · New Haven
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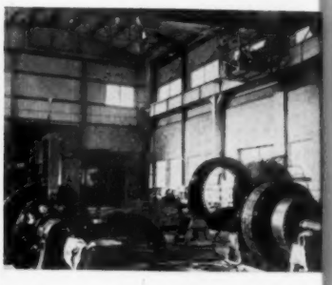
New Additions to H-VW-M Plant Facilities

Because of the steadily increasing activity in the electro-plating industry, a considerable expansion program has recently been undertaken by the company. A new office building has been built on Church Street, connected with the main office by a bridge. The additional space (approximately 2000 sq. ft., making a total of 10,000 sq. ft. of office space in all) is used as a drafting and engineering room.

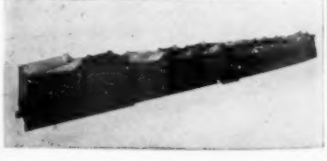
The second extension within two years has been added to the electrical shop. The building recently constructed is 54x72 which, with the first extension of 38x54 adds a total of about 6,000 sq. ft. A new railroad spur has been built with sunken tracks so that the car floor is on a level with the new concrete loading platform. A 60 ton crane has been erected for loading and unloading heavy equipment. A new electrical substation has been installed to take care of the additional load.



The two views herewith show the new drafting and engineering room and the most recent addition to the electrical shop.

Hopper Type Plating Installations Growing

In a recent issue of the H-VW-M News we gave a complete outline of a prominent New England hopper type installation. Here is another view showing one of our orders recently shipped. It has four primary tanks with hoppers for



rinsing and dips, then a seven barrel plating tank, and following this two more hopper tanks for rinsing and hot rinsing. There are great production savings, better control, improved treatment—all with less space—through the use of hopper type equipment.

H-VW-M News

Prepared by HANSON-VAN WINKLE-MUNNING CO.

APRIL, 1938 MATAWAN, N. J. Page 1

JOB SHOPS REPORT SUCCESS WITH H-VW-M BRIGHT NICKEL PLATING

The variety of work that a job shop receives puts any plating process to a severe test, and the H-VW-M Bright Nickel Plating Process has come through that test with flying colors. This is by no means surprising when it is considered that ease of control, ability to secure uninterrupted production and to turn out quality work are the outstanding features of this highly successful commercial process.

In addition to the inherent advantages of the process itself, the national set-up of job shops was

organized to give service on this bright nickel plating throughout the entire country.

Among the many job shops that recommend the H-VW-M Bright Nickel with confidence as a result of their successful experience with it, are the following:

Ames Plating Corporation
Chicopee, Mass.
Barnard & Hammond Co.
Ann Arbor, Mich.
H. C. Baum & Company, Inc.
Plainville, Conn.
Chrome-Rite Company
Chicago, Ill.
Moore Chrome Products Co.
Toledo, Ohio
National Plating Company
Milwaukee, Wis.
O'Connor Electroplating Co.
Los Angeles, Calif.
Pick Manufacturing Co.
West Bend, Wis.
Poray, Inc.
Chicago, Ill.
Tillman Electroplating Works, Inc.
New York, N. Y.
Twin City Chromium Plating Co.
Minneapolis, Minn.
Worcester Brass & Electroplating Co., Worcester, Mass.

A visit to these shops will readily demonstrate the excellent results that their customers may expect. Anyone who wants work done by a real bright nickel process in a state of perfection far in advance of methods otherwise available, will do well to send work to any of the job shops listed above.

From the customers viewpoint, it should be noted that in the H-VW-M process, the solution produces not only a distinctive, protective coating, but provides an excellent underplate for chromium, as the cobalt content produces a color practically the same as chromium, and far superior to ordinary bright nickel.

Outstanding features include a high ductility which permits bending and forming after plating and the ability to plate directly on steel. A stable solution easily maintained, high current densities and excellent throwing power make this a high speed process that can be used day in and day out with full automatic conveyors, semi-automatic conveyors, or still tanks.

The parts illustrated—plated with H-VW-M Bright Nickel—are through the courtesy of E. H. Hotchkiss Co., Barnard & Hammond, King Seeley Corp., Eaton Detroit Metal Co., Worcester Brass and Electroplating Co., Washburn Co., Mack-International Motor Truck Corp., R.C.A. Mfg. Co., and Philadelphia Storage Battery Co.

The real test of ease of control and continuity of operation, for which the H-VW-M Bright Nickel Plating Process is noted, is under the operating conditions encountered in job shops. Here, there is a wide variety of designs and styles of articles to be bright nickel finished and the volume of work requiring special attention, demands ease of control, uninterrupted production and quality work.

It was only due to H-VW-M's absolute confidence in Bright Nickel Plating that it was so highly recommended to job shops. H-VW-M engineers knew that results would warrant its use—knew it would become famous as a Bright Nickel Plating Process for greater ease of control and continuity of operation regardless of conditions—knew that the many savings in production would make it commercially successful.

WARREN TELECHRON ADOPTS AUTOMATIC HANDLING FOR PLATING ELECTRIC CLOCK PARTS

H-VW-M Return Type Automatic Conveyor Units Speed Production and Insure a Uniform Quality of Highest Grade Finishing

Two H-VW-M Automatic Conveyor Units were recently installed in the plating department of the Warren Telechron Co., of Ashland, Mass., for handling electric clock parts to and from electroplating tanks and finishing operations.

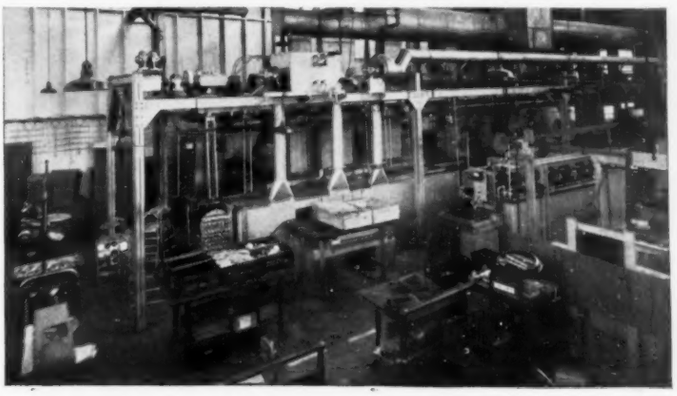
These two automatic handling systems, one a return type full automatic washing and drying conveyor and the other a semi-automatic plating conveyor make a flexible handling system for finishing and electroplating electric clock parts that not only increases production but also maintains the uniformly high quality of finish for which Warren Telechron Electric Clock parts and clocks are known.

The full automatic washing and drying conveyor is so arranged that it washes and dries an assortment of various parts at the same time. It is loaded at one end by hanging racks of work on the carriers of the conveyor. The racks are of various designs to handle different kinds of parts but all are constructed so as to be hung interchangeably on any of the conveyor carriers. The conveyor carries the rack of parts through the various washing solutions and returns them through a dryer adjacent to the loading station after which the racks of finished parts are removed from the conveyor carriers and replaced with racks of work to be washed. This forms a continuous cycle, condensing all essential treatments for all classes of work into one automatic cleaning and drying machine.

The semi-automatic plating conveyor is located parallel to the washing conveyor with its loading end near that point in the washing cycle at which the washed rack is ready for plating. Where plating is desired, an operator removes the rack of work from the washing conveyor and hangs it on a carrier of the plating conveyor which carries the work around the plating tank and returns it to the loading position. Here the rack of plated work is replaced on a carrier of the washing conveyor which carries it through the remaining cycle of operations, through the dryer and back to that station on the washing conveyor where the racks are unloaded.

The speeds of the washing and the plating conveyors are so synchronized that all the carriers of both conveyors are continuously loaded to capacity. The racks are so designed that they can be hung on any carrier of both the washing or plating conveyor.

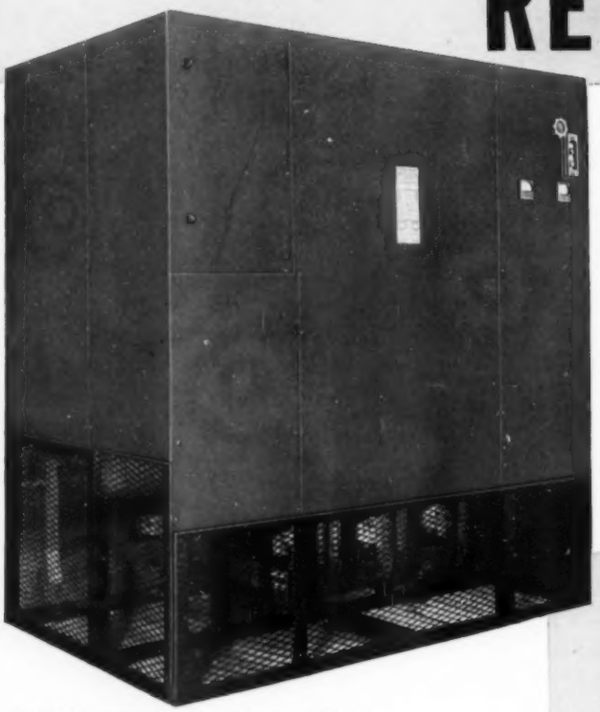
By doing the washing and plating on separate conveyors, it is possible to wash work which is not to be plated, such as work to be lacquered. This is a feature of H-VW-M Automatic Handling Units, permitting changes or additions to the kind of plating performed, and yet allowing the washing of all work on the washing conveyor.



This systematic method of H-VW-M Automatic Handling of parts to be finished makes it possible to follow an orderly, well-regulated schedule from day to day of a wide variety of parts in different styles and finishes, with no confusion and within controlled cost schedules.

This is only one of many cases where H-VW-M engineers have cooperated with manufacturers to develop automatic handling equipment to fit the particular job. The same calibre of engineering and research can be accomplished in many or, in fact, all fields involving cleaning, pickling, or electroplating productions through the cooperation of H-VW-M engineering staff.

. . and for the next half-century we offer the COPPER-OXIDE RECTIFIER



A 3000 ampere 6 volt Copper-Oxide Rectifier as furnished to a leading manufacturing concern in this country.

For the past half-century this Company has been engaged in the manufacture of Motor-Generator Sets for low voltage—high amperage applications. For many applications Motor-Generator Sets are still required.

But . .

If your requirements are for Direct Current of not more than 6 volts (converted from Alternating Current source) it will pay you to investigate the Copper-Oxide Plate Type Rectifier. Here is something as modern as a streamlined train—a complete self-contained source of current for all electro-chemical processes without moving parts.* Imagine being able to eliminate the intricacies of commutators, the cares of maintenance and the cost of brush replacement with this ***complete*** unit that can be installed ***anywhere*** without special foundations, etc.—yet still maintain high power factor, efficiency and long life. It will be well worth your while to investigate this latest product of the joint efforts of The Westinghouse Electric & Manufacturing Company and The Hanson-Van Winkle-Munning Company.

*A small fan is used for ventilation.

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NEW SISALIN SECTIONS FOR BETTER BUFFING

Sisalin Sections are a new development which we have recently put on the market under patents recently granted.

Sisal is a tough fibre used in the manufacture of rope and binder twine. The Sisal used in these sections is in specially prepared mat form. The Sisal is interleaved with alternate layers of muslin and the resultant product is then bound together with various types of sewing. The external appearance of a Sisalin Section is much the same as an ordinary buff section.

The principal use of this product is for intermediate operations between polishing and buffing. These sections better accomplish the removal of minor imperfections or dig marks from the base metal than either polishing or cutting down.

Sisalin Sections are used on carbon steel, stainless steel, brass, copper and aluminum. Compositions used vary with the type of metal and finish to be produced. Generally, compounds are limited to tripoli, stainless steel rouge, and emery paste. Composition saving is effected using this product, as excellent composition retention is obtained between the strands of the sisal. When a comparatively high finish is desired using this product, compositions of a dry type are used.

A patent on this product was granted to us under date of February 22, 1938, and results of Sisalin Sections under the severest conditions point to an increasing demand for their use in all intermediate operations.

SINCE 1820 . . . . OUT AHEAD

Each product bearing the H-VW-M trademark reflects quality, expert workmanship and dependable performance. Collectively they are the result of 118 years of experience in the manufacture of electroplating and polishing equipment and supplies. They form a part of the continued pioneering work in design and manufacture which has kept Hanson-Van Winkle-Munning equipment in the lead for so many years.

Abrasives
Anodes
Filter Bags
Brushes
Buffs
Burnishing Barrels
Centrifugal Dryers
Chemicals
Cleaners
Compositions
Conveyors
Dipping Baskets
Galvanizing Flux
Generators
Generator Control Panels
Generator Brushes
Glue
Kote-Rax
Lathes
Nickel Brightener
Plating Barrels
Plating Processes
Bright Nickel
Bright Zinc
Cadmium
Plating Rectifiers
Rheostats—Tank
Soap
Tanks
Tinning Flux
Wheels

H-VW-M News

Prepared by HANSON-VAN WINKLE-MUNNING CO.

JUNE, 1938 MATAWAN, N. J. Page 1

DON'T MISS LEARNING MORE ABOUT THE NEW H-VW-M FEATURE AT THE CONVENTION

"Product Development", by H-VW-M Engineers, is notable for many reasons, but primarily it is outstanding because it has been so successful and produced such profitable results throughout the entire plating industry.

Let's start by listing the more important H-VW-M achievements:

Many have already seen some of the recent H-VW-M developments in successful operation, some have read about them in magazine editorials and advertising—but there is no better place to obtain first-hand information than from the H-VW-M representatives attending the Convention. Here you have an opportunity to learn about the latest applications and to hear about certain new developments not yet fully released for publication.

BRIGHT-NICKEL

There are definite reasons and unusual advantages for the unprecedented success and popularity of H-VW-M Bright Nickel. The one that is paramount is that each and every ingredient in the solution including the Brightening Agent, can be very closely controlled by simple chemical analysis. No chemical engineering knowledge is needed.

BRIGHT ZINC

H-VW-M Mazic Bright Zinc Process permits heavy deposits from a cyanide solution with a beautiful bright finish at low cost. Deposits are fine grained, dense and ductile. They are highly protective.

RECTIFIER

H-VW-M have developed under Westinghouse Electric and Manufacturing Co., patents, Copper Oxide Plate Type Rectifiers for converting alternating current into direct current for electroplating. Installation is simple and maintenance is extremely low in cost.

HOMOPOLAR GENERATORS

Unusual attention was attracted to the H-VW-M Homopolar Generator recently installed at the Cambria Plant of the Bethlehem Steel Co., Johnstown, Pa. This generator is rated 12 Volts and 40,000 Amperes and is the supply for the electrodeposition current which is used in the new method of "Bethanizing" zinc steel wire by electroplating.

NEW COMPOSITIONS

H-VW-M offers new compounds for finishing metal plated parts. A complete line of cutting down and coloring compositions have been developed for use on plastics. Also, compounds have been introduced for the purpose of producing a brilliant surface lustre with a minimum of effort.

IMPREGNATED BUFFS

H-VW-M Treated Economy and Treated Tractor buffing cloths as they come from the loom are passed through a chemical bath, the purpose of which is to increase the wear resistance of the cloth and produce better buffing results.

SISALIN SECTIONS

Sisalin Sections are a new development which H-VW-M have recently put on the market under newly granted patents. In external appearance, it is much the same as an ordinary buff section. Sisal is a tough fibre used in the manufacture of rough and binder twine. The principal use of Sisalin Sections is for intermediate operations between polishing and buffing.

OBLIQUE PLATING UNITS

The Mercil Type Oblique Plating apparatus which has attracted considerable attention offers many advantages. Units can be coupled together to increase production. They can be adjusted to the best working position for greater convenience and will operate at different speeds.

AUTOMATIC CLEANING UNIT (Barrel Application)

This is a new and recently developed type of full automatic cleaning unit for barrel application. In design it introduces something entirely different in handling of parts with an automatic principle never before used.

SPECIAL PLATING MACHINE

H-VW-M has recently developed conveyor mechanism to plate the zipper fastener in strip form. The zipper fastener, when manufactured is attached to a cloth braid. This cloth, which must pass through the solutions during the plating process, requires special handling and has been responsible for the development of this unique plating mechanism. It can be adopted to other uses for continuous plating on various types of small work.

A. E. S. CONVENTION AT MILWAUKEE

MIDDLE WESTERN DELEGATION ENTERTAINS

The 1938 Convention of the American Electro-Platers' Society will be held in Milwaukee June 13th to 16th under the auspices of the Milwaukee Branch.

An advance resume of the program shows five Educational Sessions and two Business Sessions, interspersed with attractive entertainment features for both men and ladies in attendance. Speakers at the Educational Sessions are prominent plating authorities and their subjects cover a wide range of interesting phases of plating work. In addition to Plant Visitation trips to three prominent plants where plating is extensively used, there will be the usual Fellowship entertainment, Annual Banquet, a picnic at Waukesha Beach and other special intermediate features for all delegates and guests.

Milwaukee is a magnetic and charming city that possesses an air of hospitality which has always made it a successful gathering place. The advantage of being centrally located means low average travelling expenses for the entire country. It is served by three trunk line railroads; several bus, electric and steamship lines; and two transcontinental airlines. The Hotel Schroeder, which is headquarters, is centrally located and noted for its accommodations.

Hanson - Van Winkle - Munning urges every plater to attend this Convention and extends its congratulations and cooperation to those members of the Milwaukee Branch who have worked so hard to make it a success. The Company will have several representatives at the meetings, including V. W. Todd, President; C. W. Yerger, Vice President and Sales Manager; H. C. Stewart, Milwaukee representative; George B. Hogaboom from the home office at Matawan; Messrs. Smallman, Granquist, Murphy, Knights and Mattacotti from the Chicago office; George Knecht, New Haven representative; O. S. Tyson, Advertising Counsel; and others.

A MILWAUKEE EDITION OF H-VW-M DAILY CONVENTION NEWS

The Hanson-Van Winkle-Munning Official Convention News will again be published daily and delivered before breakfast to all delegates and their friends.

The "News" was started at the Bridgeport Convention in 1935 and was again published at the Cleveland and New York Conventions. It will assist the Program and Entertainment Committees in giving complete information on each day's doings and contain the usual spicy editorials, personals, and cartoons to cheer up the morning hours of the hard-working delegates. Extra copies will be available to "send home" to those poor souls who can't get to Milwaukee and keep up-to-date on current Convention activities.

THE MAYOR PRESENTS THE KEY TO THE CITY
THE COAT OF ARMS OF THE FAMOUS CITY
On, Wisconsin
WATCH THE GOOD LUCK SPINNING COIN!
ALL ROADS LEAD TO MILWAUKEE WHERE THERE'S "CHEER" THAT MADE MILWAUKEE FAMOUS!

SINCE 1820 OUT AHEAD

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Abrasives
Anodes
Filter Bags
Brushes
Buffs
Burnishing Barrels
Centrifugal Dryers
Chemicals
Cleaners
Compositions
Conveyors
Dipping Baskets
Galvanizing Flux
Generators
Generator Control Panels
Generator Brushes
Glue
Kote-Rax
Lathes
Nickel Brightener
Plating Barrels
Plating Processes
Bright Nickel
Bright Zinc
Cadmium Plating
Rectifiers
Rheostats-Tank
Soap
Tanks
Tinning Flux
Wheels

NOTE

If you are not attending the A.E.S. Convention at Milwaukee, where first-hand information on H-VW-M "new developments" can be obtained, and want further details on any or all articles reviewed herewith, write us direct and we will gladly send full data.

"SPINNING" BRIGHT NICKEL

Nope, it's not what you think if your imagination flashes back to the usual phrase of spun metal.

To "spin" Bright Nickel at the Convention merely obtain one of the H-VW-M souvenir Good Luck spinning coins—and watch results.

There'll be many a yarn "spun" as to profits obtained through the use of H-VW-M Good Luck spinning coins—and probably very little said about losses.

It's something NEW—there's a real "twist" to its use. Make sure you get one—and have Good Luck.

INTO THE FUTURE

1940
1920
1900
1880
1860
1840
1820
FROM THE PAST

Since the establishment of Hanson-Van Winkle-Munning in 1820, our organization has always looked *into the future* toward continued advancements and improvements in the electro-plating field.

We have seen the growth from a small and scattered rule-of-thumb group of struggling platers to a large and strongly knit industry of scientifically trained men improving products through better finishes.

We have seen plating equipment and supplies change from crude adaptations of some individual's favorite practice to well-designed and thoroughly engineered products developed to meet definite chemical reactions and keep step with modern production demands.

Our part has been always to keep looking *into the future* — to work in advance of current practice — to seek out new methods — to design new products — to add new improvements — to find new ways. As the growth of the plating industry has helped our growth — so our growth has helped that of the industry.

In 1938, as in 1820, we continue to look *from the past, into the future* — with the industry — and for the industry.

HANSON-VAN WINKLE-MUNNING CO. · MATAWAN, NEW JERSEY · SINCE 1820

Manufacturers of a complete line of electroplating and polishing equipment and supplies

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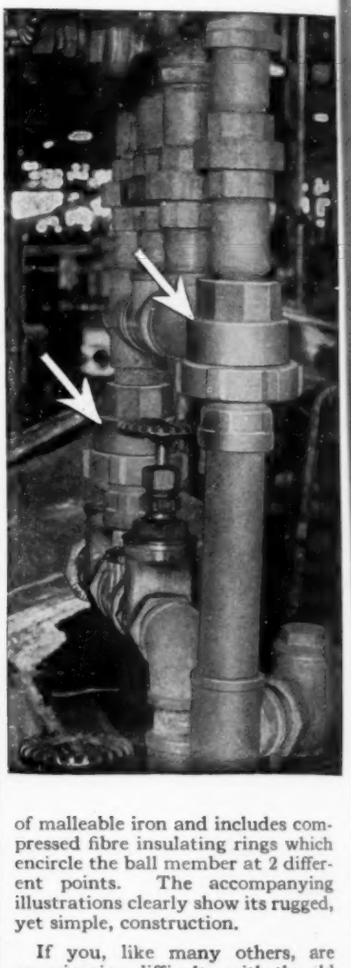
MATAWAN, NEW JERSEY
PLANTS Matawan, New Jersey . . Anderson, Indiana . . Bridgeport, Connecticut
SALES OFFICES · Chicago · Cleveland · Detroit · New Haven
New York · Philadelphia · Pittsburgh · Springfield (Mass.) · Syracuse

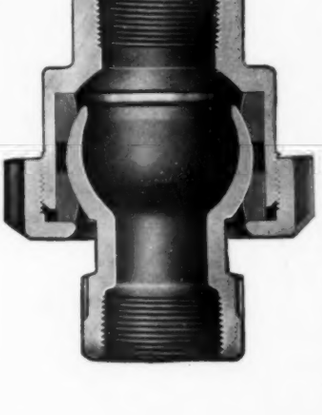
HIGH PRESSURE INSULATING JOINTS

To avoid electrical grounds on steam, water, and drain lines in your electroplating solutions, use the new high-pressure joint. It resists excessive steam pressure, as high as 200 lbs. The joint itself is



of malleable iron and includes compressed fibre insulating rings which encircle the ball member at 2 different points. The accompanying illustrations clearly show its rugged, yet simple, construction.

If you, like many others, are experiencing difficulty with the old one-piece steam insulating joint, let us solve your problem with our high pressure union. It is known as our Type B, and is available in practically all sizes.



H-VW-M News

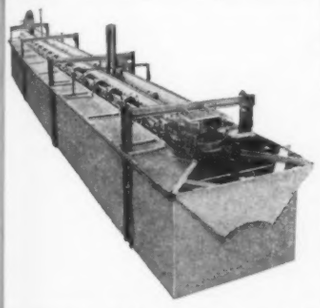
Prepared by HANSON-VAN WINKLE-MUNNING CO.

AUGUST, 1938 MATAWAN, N. J. Page 1

UNIQUE VENTILATION OF HOT PLATING SOLUTIONS

A unique and positive method of ventilating hot plating solutions is illustrated herewith in connection with a H-VW-M semi-automatic plating conveyor.

The top of the entire tank area is enclosed by hinged hoods,



or covers, which can be readily swung back to service anodes. In the illustration the hood is shown open at the nearest end of the tank, while the remaining sections are closed.

Such an installation requires only a small blower of low capacity to effectively remove troublesome fumes.

For acid plating solutions the hoods are either rubber covered or given an acid proof rubber cement coating.

The Chicago plant of the Western Electric Company has had one of these installations in successful operation for over a year using a hot cyanide zinc plating solution.

FOR BETTER METAL PROTECTION

You can absolutely depend upon solving rust-proofing problems by using two tried and tested processes which are in use in a wide variety of plants as well as by numerous job plating shops.

One of these is CADUX cadmium plating which serves a two-fold purpose. It provides a beautiful rust-proof finish and converts easily rusting metals to highly rust-resisting materials.

The other is MAZIC Bright Zinc which is the superlative in rust protection finishes. Fifty years of research have proven the superiority of zinc for many uses and today it stands unchallenged. A zinc coating affords a greater protection against rust than that of any other metal commercially practical for certain uses.

Both of these products can be applied with close technical control under modern production methods with an advance knowledge of how each item should be treated to give best results—speedily, and at low cost.

METAL WASH HOT-AND-COLD-BLAST NON-STAINING DRYER

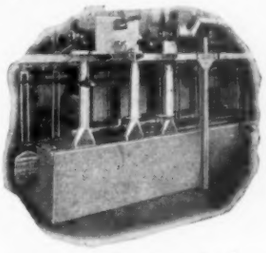
One of the recent advancements introduced by Hanson-Van Winkle-Munning is the metal wash hot-and-cold-blast non-staining dryer. This is particularly adaptable to nickel plating layouts and in addition to many new installations, older layouts are rapidly being revamped.

This is the only available equipment on the market today which effectively blows off 80% of the adhering water liquid before the work travels into the hot blast chamber where the other 20% is evaporated.

The salts contaminating the water, which normally remain after the water is evaporated by the hot rinse tank method, are entirely blown off in the cold blast chamber and thus climinate staining.

The work preferably goes from a cold water rinse into the dryer to prevent any drying from taking effect until the work is passed through the cold blast chamber.

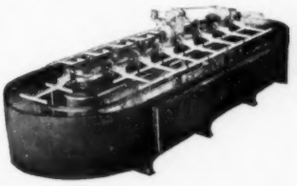
A view of a H-VW-M metal wash hot-and-cold-blast non-staining dryer is shown in the



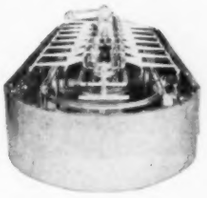
accompanying illustration. This view was taken in the plant of the Warren Telechron Co., Ashland, Mass. and the entire installation was more fully described in the April 1938 issue of the News. A copy will be sent upon request.

REAL AND EFFECTIVE MECHANICAL AGITATION

Mechanical agitation has been proven necessary for certain forms of nickel solution, especially in the silver plating industry on tableware. Various attempts have been made to successfully develop a *real* and *effective* mechanical agitation, but Hanson-Van Winkle-Munning has introduced the first mechanical *oscillating* agitation that gives the carrier motion in three directions.



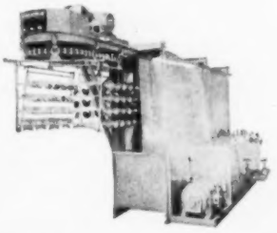
The two pictures shown illustrate one of our installations in a large silverware plant. The machine is designed to give the carrier motion up-and-down, sideways, and back-and-forth paralleling the chain. The most important motion, however, is the side sway to and from the anodes.



Such mechanical oscillating agitation greatly improves the structure of the plate and gives greater uniformity in spreading the thickness. It has been applied successfully to full automatics, as well as semi-automatics, and is permitting higher current densities and better factors wherever used.

NEW PRINCIPLE IN MECHANICAL WASHING

A new principle in mechanical washing is being incorporated on H-VW-M full automatics which does away with long soaking and cleaning treatments. An illustration of this washer is shown and several installations are already in successful operation.



By this method of mechanical washing it is possible to utilize only a short immersion in an electric cleaner. Also, where this washer is used, degreasing is not essential.

H-VW-M "CONVENTION DAILY" WELL RECEIVED

We have been pleased by the various comments on the "Daily" published in newspaper form at the Milwaukee Convention. None have been more greatly appreciated, however, than the following "official document" signed by three members of the Milwaukee Convention Committee:

June 16, 1938.

To the Hanson-Van Winkle-Munning Co.
Matawan, N. J.

Whereas,

One of the features contributing to the enjoyment of the delegates and visitors to the various conventions of the A.E.S. has been the H-VW-M Official Convention News, issued daily during each Convention. It has given many interesting highlights about activities and personalities which have added to the satisfaction and pleasure of all attending the Convention,

Therefore, be it resolved,

That we go on record in expressing our appreciation and thanks to the Hanson-Van Winkle-Munning Company for the added pleasure this publication has given us during our stay and the hope that it will continue in future years as in the past.

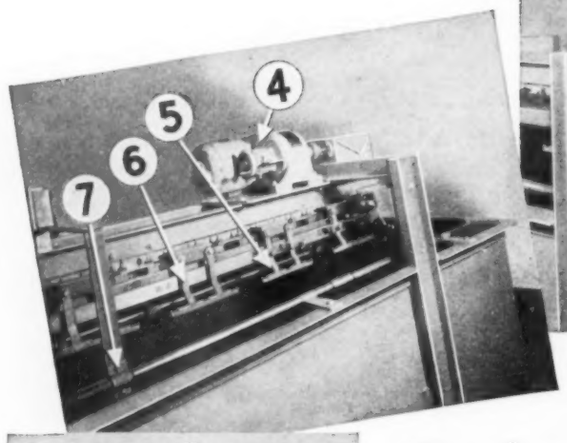
Committee:
W. FRAINE
H. A. GILBERTSON
W. B. SCOTT

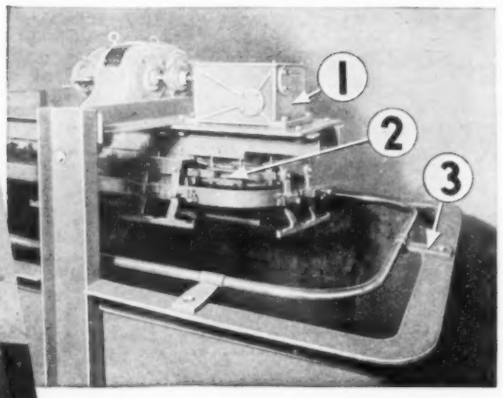
SINCE 1820 . . . OUT AHEAD

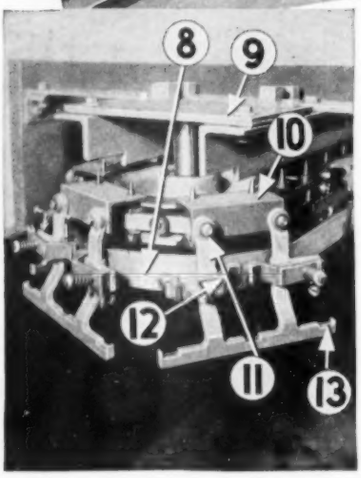
Each product bearing the H-VW-M trademark reflects quality, expert workmanship and dependable performance. Collectively they are the result of 118 years of experience in the manufacture of electroplating and polishing equipment and supplies. They form a part of the continued pioneering work in design and manufacture which has kept Hanson-Van Winkle-Munning equipment in the lead for so many years.

Abrasives	Cleaners	Generator Brushes	Bright Zinc
Anodes	Compositions	Glue	Cadmium
Filter Bags	Conveyors	Kote-Rax	Plating Rectifiers
Brushes	Dipping Baskets	Lathes	Rheostats—Tank
Buffs	Galvanizing Flux	Nickel Brightener	Soap
Burnishing Barrels	Generators	Plating Barrels	Tanks
Centrifugal Dryers	Generator Control Panels	Plating Processes	Tinning Flux
Chemicals		Bright Nickel	Wheels

Outstanding Features..







Point the Way!

1. Totally enclosed gear drive.
2. 4" pitch heavy type conveyor chain with hardened rollers and pins.
3. Insulated anode rod brackets.
4. U. S. vari-speed drive.
5. Carrier with composition collector fingers for heavy amperages.
6. Carrier without composition fingers for light amperages.
7. Anode rod bus bar terminal.
8. 2" x ½" copper cathode bar.
9. Idler end sprocket take-up.
10. Removable carrier.
11. Heavy disc and sleeve insulators.
12. Graphitic copper current fingers.
13. Notch for rack hooks.

The many outstanding features of the Hanson - Van Winkle - Munning Semi-Automatic Conveyors point the way to convenient and continuous operation with unsurpassed and uniform results.

Easily removable carriers of any design to meet individual needs can be placed at any desired interval—auxiliary collector fingers can be provided for handling high currents—conveyor chain driven at any predetermined speed by compact, motor-driven, variable speed transmission with roller bearings to eliminate friction and wear—both load in tank and plating time remain constant, assuring uniform thickness of plate and elimination of rejects common to hand operated still tanks.

Also note the other features pointed out in the pictures above.

H-VW-M Semi-Automatic and Full Automatic Conveyors are ruggedly built for long life. Write for complete details.

Manufacturers of a complete line of electroplating and polishing equipment and supplies

HANSON-VAN WINKLE-MUNNING CO.

MATAWAN, NEW JERSEY

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New York · Philadelphia · Pittsburgh · Springfield (Mass.) · Syracuse

WHAT HO! TRAFFIC BEWARE!

Bicycle riding is coming back into fashion again as many platers can prove by the amount of chrome plated handle bars and other parts passing through the shop.

But derby hats! And huge thugs! Well, we wonder just how fashionable they are to be during the coming year on our shaded suburban highways and well-paved city streets.

So as to ease your mind, let us point out that this picture does not represent any preview of what the fashionable cyclist will wear or ride during the next decade.

To understand when this picture was in style, one has to

step back to page 4 of our Special Bulletin (produced in blue cover with a fancy design) published in 1893 describing our latest model Bicycle-Power Plating Dynamo. Think of it, only 45 years ago and we were proudly offering this equipment to platers!

Well, that only goes to show how things improve and that during the 118 years since we were established many strange plating processes and improvements have passed through our plants.

Perhaps after studying this strange fellow and his iron steed you will appreciate what we mean by "experience"—what it must stand for in our up-to-date equipment of today—what a background of developments and processes our organization has—what values we can offer you in your present-day plating problems.

H-VW-M BRIGHT NICKEL ELIMINATES BUFFING

It is possible to deposit H-VW-M Cobalt Bright Nickel plate on die castings by a heavy under-deposit of copper (either acid or cyanide) without buffing copper. An extremely bright nickel is brought out over the copper. No buffing of the nickel is necessary, nor of chrome if it is deposited over the nickel.

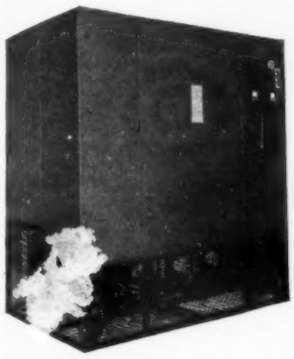
H-VW-M News

Prepared by HANSON-VAN WINKLE-MUNNING CO.

OCTOBER, 1938 MATAWAN, N. J. Page 1

DEMANDS INCREASING FOR COPPER-OXIDE PLATE RECTIFIERS

For over half a century H-VW-M has led in the manufacture of motor generator sets for low voltage-high amperage applications. For this reason, if no other, our organization investigated fully the advantages of copper-oxide plate rectifiers before offering them to our customers.



For many applications motor-generator sets are still required but when requirements for direct current converted from alternating current are not more than six volts, we suggest a study of the rectifier. It is a single, complete cabinet unit with no moving parts except a small fan; and it eliminates commutators, brushes, foundations and many other costly features of a motor generator.

One obtains at the outset the freedom of initial installation cost, the compactness and simplicity of a piece of non-moving-part equipment, ease of operation, and high overall efficiency and power factor; one obtains later the savings in upkeep, absence of servicing and worn parts, and continued efficiency at low upkeep and operating costs.

BRIGHT NICKEL PLATING STILL MAKES GAINS

Ease of control, uninterrupted production and quality work have been the main features leading to the rapid growth of H-VW-M Bright Nickel Plating installations. The large number of users of this process are finding it to be a commercially successful plating process that can be used day in and day out with full automatic conveyors, semi-automatic conveyors or still tanks. Products which lend themselves to the process include hardware articles, kitchen utensils, radio parts, automobile accessories, parts and insignias, plumbing fixtures, electrical appliances, and many others.

(*Continued on Page Two*)

THERE MUST BE SOMETHING TO IT!

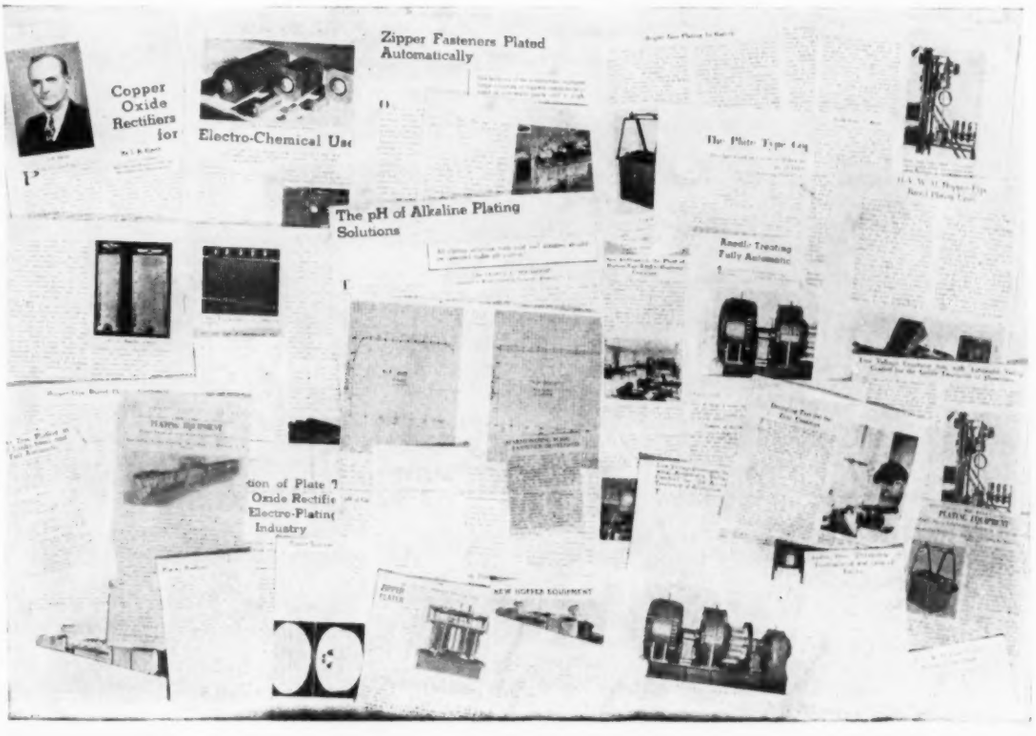
So Far This Year Twenty-Two Editors Have Told Over 1,711,286 Readers About H-VW-M Equipment

During the first nine months of this year—beginning January 1938 and through September—the editors of twenty-two publications have published editorial material relative to H-VW-M advancements, installations and products. One publication (in the metal finishing field, of course) ran eleven articles during these nine months; many others ran from four to eight; some ran less. For instance, only one editorial article appeared in HIDE & LEATHER, SHOE AND LEATHER FACTS and WOMEN'S WEAR—but these editors believed the H-VW-M Zipper plating installation was real news to their field.

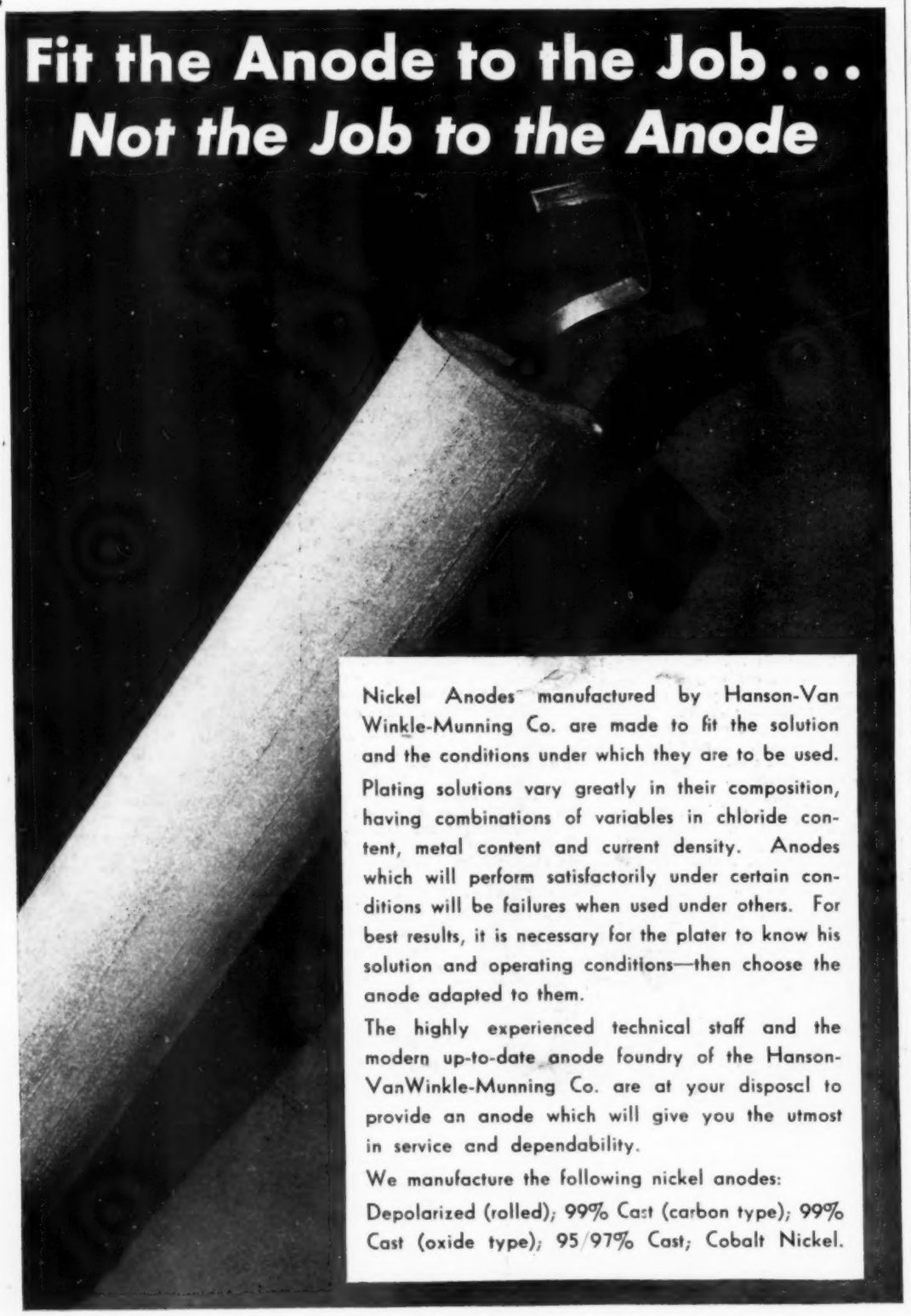
We do not retain a commercial clipping bureau and therefore only find such articles in those publications we receive (and probably miss some in these), but our check shows that the total number of readers reached by editorial articles in the publications we checked comes to approximately one and three quarter million. There were probably many other articles in other magazines. Think of it! This is not any part of our *advertising*—it is not anything over which we have control—it is merely what editors consider news and worth printing for their readers. Surely this reflects H-VW-M advancement, progress and leadership.

Some of these articles are illustrated on this page. They varied from a seven-page story on Copper Oxide Rectifiers with thirteen illustrations, to a five page article with five illustrations, to a single page story with two illustrations, to smaller write-ups of a variety of new products and equipment. Such H-VW-M products were mentioned as Copper Oxide Rectifiers, Alkaline Plating Solutions, Simple Methods of Analysis, Coloring Compounds, Buffs, Semi and Full Automatic Plating Equipment, Zinc Coatings, Low Voltage Generator Sets, Tank and Barrel Equipment, Testing Equipment, Polishing Wheels, Hopper Type Units, Anode Filter Bags, etc.

An indication of the diversity of interest in H-VW-M products in many fields of industry is further indicated by the following list of publications from which the clippings illustrated on this page were taken: ABRASIVES, AMERICAN ELECTROPLATERS' SOCIETY REVIEW, AMERICAN MACHINIST, AUTOMOTIVE INDUSTRIES, CHEMICAL INDUSTRIES, ELECTRICAL MANUFACTURING, ELECTRICAL ENGINEERING, FACTORY, HIDE & LEATHER (with SHOE FACTORY), IRON AGE, INDUSTRIAL EQUIPMENT NEWS, MACHINERY, METAL INDUSTRY, METAL CLEANING AND FINISHING, METALS AND ALLOYS, MILL AND FACTORY, NEW EQUIPMENT DIGEST, PRODUCT ENGINEERING, PRODUCT FINISHING, SHOE AND LEATHER, STEEL, and WOMEN'S WEAR.


Zipper Fasteners Plated Automatically
Copper Oxide Rectifiers for
Electro-Chemical Use
The pH of Alkaline Plating Solutions

Fit the Anode to the Job . . . Not the Job to the Anode



Nickel Anodes manufactured by Hanson-Van Winkle-Munning Co. are made to fit the solution and the conditions under which they are to be used.

Plating solutions vary greatly in their composition, having combinations of variables in chloride content, metal content and current density. Anodes which will perform satisfactorily under certain conditions will be failures when used under others. For best results, it is necessary for the plater to know his solution and operating conditions—then choose the anode adapted to them.

The highly experienced technical staff and the modern up-to-date anode foundry of the Hanson-VanWinkle-Munning Co. are at your disposal to provide an anode which will give you the utmost in service and dependability.

We manufacture the following nickel anodes:

Depolarized (rolled); 99% Cast (carbon type); 99% Cast (oxide type); 95/97% Cast; Cobalt Nickel.

HANSON-VAN WINKLE-MUNNING CO. SINCE 1820

Manufacturers of a complete line of electroplating and polishing equipment and supplies

HANSON-VAN WINKLE-MUNNING CO.

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BRIGHT NICKEL—*Continued from Page 1*

H-VW-M Bright Nickel also eliminates buffing as it is possible to deposit H-VW-M Cobalt Bright Nickel plate on castings by a heavy under-deposit of copper (either acid or cyanide) without buffing the copper. An extremely bright nickel is brought out over the copper. No buffing of the nickel is necessary, nor of chrome if it is deposited over the nickel.

Both Job Shops and Manufacturers find that H-VW-M Bright Nickel comes through with flying colors on the hardest tests. This is largely due to ease of control, ability to secure uninterrupted production, and adaptability to turn out continued high quality of work.

THE BEST CLEANERS HAVE DEFINITE QUALITIES

After all, the relative merits of an electric Cleaner are best judged by how it does the required job—the results obtained—and the time taken to produce such results.

However, there are certain fundamental requisites that any efficient electric Cleaner must have and there is little chance of obtaining the best results without such definite characteristics at the start. These are: 1, High Conductivity; 2, Positive Detergent Properties; 3, Uniform Stability of Alkali; 4, Freedom from Colloidal Matter. These four qualities are so outstanding in Matawan Cleaners that for years, wherever costs are ascertained and controlled, Matawan Cleaners have been considered the STANDARD. Because they start with the correct properties which are definitely studied and controlled, they give complete satisfaction on the job in an economical manner. Recent data on Matawan Cleaners is available and will bring you up-to-date on the most recent developments.

BETTER COMPOSITIONS THROUGH YEARS OF DEVELOPMENT

For years and years, Hanson-Van Winkle-Munning have studied and experimented with Compositions—not only in our Laboratories, but under all kinds of practical operating conditions. The result is that Hanson - Van Winkle - Munning Compositions are so constituted and assembled to give definite amounts of cutting, semi-cutting and coloring to meet varying conditions on a wide range of different jobs. They give greater traction for cutting, less traction for semi-cutting, and still less traction for coloring. This also applies to cutting-down and coloring Compositions particularly adaptable for plastics with special attention given to the elimination of "dragging", or drag marks, on the surface of the molded part.

H-VW-M News

Prepared by HANSON-VAN WINKLE-MUNNING CO.

DECEMBER, 1938 — MATAWAN, N. J. — Page 1

PLATERS FIND "SIMPLE METHODS" BOOKLET VALUABLE

Demand for 4th Edition

A new edition of the well-known booklet, "Simple Methods of Analyzing Plating Solutions" has been published by H-VW-M. It describes the methods, in commercial practice, of analyzing electroplating solutions of all important commercial metals, including nickel, brass, cadmium, copper, chromium, gold, silver, tin and zinc, for all of the important commercial constituents.

The outstanding feature of this booklet is that the methods described, while technically correct for commercial control of solutions, do not require a trained chemist to operate them. Chemical analysis can be made by any plater with only an ordinary education, who can learn in a short time to control solutions just as an amateur can learn to drive an automobile without being a combustion engineer. Since all the methods of analysis are volumetric, no analytical balances or complicated mathematical computations are required. The factors of each standard solution are printed on the label.

Added to the new edition are a number of useful charts and tables.

BETTER COMPOSITIONS THROUGH YEARS OF DEVELOPMENT

For years and years, Hanson-Van Winkle-Munning have studied and experimented with Compositions—not only in our Laboratories, but under all kinds of practical operating conditions. The result is that Hanson - Van Winkle - Munning Compositions are so constituted and assembled as to give definite amounts of cutting, semi-cutting and coloring to meet varying conditions on a wide range of different jobs. They give greater traction for cutting, less traction for semi-cutting, and still less traction for coloring. This also applies to cutting-down and coloring Compositions particularly adaptable for plastics with special attention given to the elimination of "dragging", or drag marks, on the surface of the molded part.

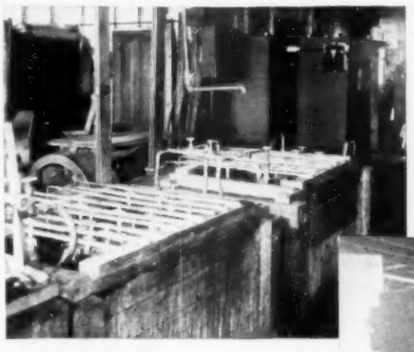
EASTMAN KODAK PLATES COBALT NICKEL

Eastman Kodak, Rochester, N. Y., have reported that they are now plating cobalt nickel and obtaining highly satisfactory results. This is a new departure for the Eastman plating department and was only started after a long series of tests and experiments.

NEW ELECTROTYPING PROCESS SUCCESSFUL

First Copper Oxide Rectifier Installation at Baltimore

A new and interesting type of electrical equipment has recently been installed by the Shane-Beever Company, well-known electrotypers of Baltimore, Maryland. This consists of a copper oxide rectifier to supply the current used in the deposition of copper and nickel electrotypes. This is the first large installation in the United States in this industry. The plant has been in use for several months and its performance, from the start, has been highly satisfactory, especially as to economy of operation.



At left: Showing Shane-Beever installation with plating tanks in foreground.

Below: Showing copper oxide rectifier unit as installed in this plant.

The use of the H-VW-M rectifier involved a change from the former operation of motor-generator sets and also a change from the use of direct current to alternating current for the power supply.

One copper oxide rectifier of 3,000 ampere, 6 volt capacity replaced two 1,500 ampere motor-generator sets with DC motors. It is interesting to note that due to plant space and elevator facilities a single rectifier of the size required could not be installed so two smaller units were used and hooked together for single unit operation.

The new combination has resulted in appreciable savings in power bills. The installation cost was about one-half the cost of installing a motor generator set. The maintenance cost is very low, mainly because the rectifier has no moving parts and requires no attendance by skilled electricians who are necessary for the care of rotating machinery like generators. The Shane-Beever Company has found this condition ideal for an electrotyping shop which normally has no electricians on its staff and is, therefore, freed from the need of calling in such skilled help to service its equipment.

The copper oxide rectifier, accomplishes the rectification or conversion of alternating current into direct current by leading alternating current to a suitable step-down transformer which changes it to low voltage, high amperage alternating current. This low voltage alternating current is led to the rectifier plate assemblies, a series of copper plates which have been oxidized by a special heat treating process so that they have a uniform, dense and highly adherent coating of cuprous oxide. It is at the contact surface of the copper and cuprous oxide that rectification takes place. The direct current is led out of the rectifier by requisite leads to the equipment using it; in the instance described above, electrolytic solutions of copper and nickel for producing electrotypes.

Mr. James B. Thompson, President of Shane-Beever Co., recently wrote us as follows: "Word got around about our new equipment and quite a few of the boys asked me many questions. I told them about the satisfactory operation and also that they should check into the copper oxide rectifier as in our opinion, it was the most satisfactory type of equipment".

NEW SISALIN SECTIONS FOR BETTER BUFFING

Sisalin Sections are a new development which we have recently put on the market under patents recently granted.

Sisal is a tough fibre used in the manufacture of rope and binder twine. The Sisal used in these sections is in specially prepared mat form. The Sisal is interleaved with alternate layers of muslin and the resultant product is then bound together with various types of sewing. The external appearance of a Sisalin Section is much the same as an ordinary buff section.

The principal use of this product is for intermediate operations between polishing and buffing. These sections better accomplish the removal of minor imperfections or die marks from the base metal than either polishing or cutting down.

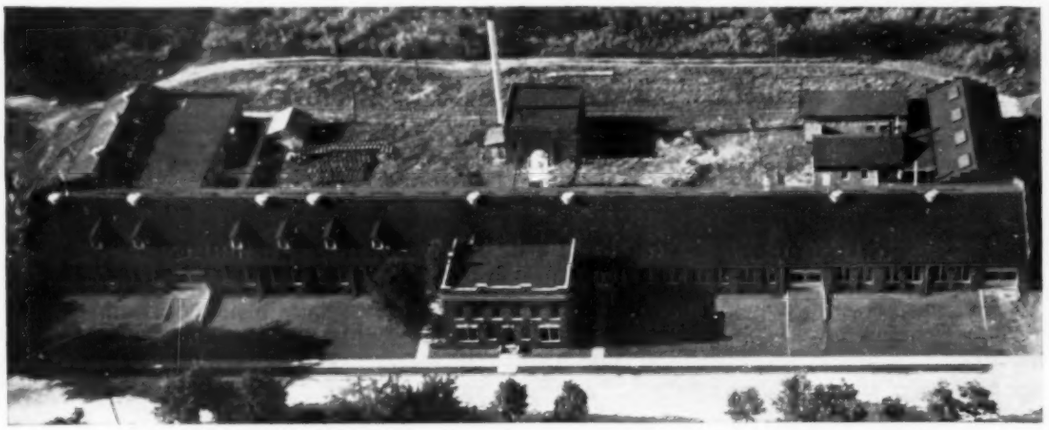
Sisalin Sections are used on carbon steel, stainless steel, brass, copper and aluminum. Compositions used vary with the type of metal and finish to be produced. Generally, compounds are limited to tripoli, stainless steel rouge, and emery paste. Composition saving is effected using this product, as excellent composition retention is obtained between the strands of the sisal. When a comparatively high finish is desired using this product, compositions of a dry type are used.

A patent on this product was granted to us under date of February 22, 1938, and results of Sisalin Sections under the severest conditions point to an increasing demand for their use in all intermediate operations.

THE BEST CLEANERS HAVE DEFINITE QUALITIES

After all, the relative merits of an electric Cleaner are best judged by how it does the required job—the results obtained—and the time taken to produce such results.

However, there are certain fundamental requisites that any efficient electric Cleaner must have and there is little chance of obtaining the best results without such definite characteristics at the start. These are: 1, High Conductivity; 2, Positive Detergent Properties; 3, Uniform Stability of Alkali; 4, Freedom from Colloidal Matter. These four qualities are so outstanding in Matawan Cleaners that for years, wherever costs are ascertained and controlled, Matawan Cleaners have been considered the STANDARD. Because they start with the correct properties which are definitely studied and controlled, they give complete satisfaction on the job in an economical manner. Recent data on Matawan Cleaners is available and will bring you up-to-date on the most recent developments.



ANDERSON, INDIANA PLANT OF H-VW-M.

Among other views taken this Fall by an Aerial Camera Survey in Indiana was this one of our Anderson Plant. We hope soon to be able to publish new photographs of our home plant at Matawan and our newer Bridgeport Plant.

SISALIN SECTIONS *used for buffing*

The view of the Sisalin Section above shows how the Sisal is interleaved with layers of cloth and then bound with various types of sewings. The lower photograph shows a view of the face of a Sisalin Section.

Although a comparatively new development, Sisalin Sections have already proven their value for better buffing results. They are invaluable for intermediate operations between polishing and buffing. They better accomplish the removal of imperfections or die marks from the base metal than either polishing or cutting down. They are good for finishing steel prior to bright nickel application, and their use has even been extended to intricate nickel buffing.

Sisalin Sections can be used with practically any type of composition and are now produced, through a recent highly perfected manufacturing technique, in four thicknesses—¼ inch, ½ inch, ¾ inch and 1 inch.

Sisalin Sections are also made into polishing wheels and result in a very efficient light weight wheel suitable for polishing flat and slightly curved surfaces. The fibre has excellent bonding action with the glue or cement, and can be used for any graining size.

Write for data and samples of this new patented buffing product made from the tough Sisal Fibre used in the manufacture of rope and binder twine. Also send for our 22-page bulletin BC-104 covering a wide variety of Buffs and Compositions.

Manufacturers of a complete line of electroplating and polishing equipment and supplies

HANSON-VAN WINKLE-MUNNING CO.

MATAWAN, NEW JERSEY

PLANTS Matawan, New Jersey . . Anderson, Indiana . . Bridgeport, Connecticut

SALES OFFICES · Chicago · Cleveland · Detroit · New Haven · New York · Philadelphia · Pittsburgh · Springfield (Mass.) · Syracuse

RECTIFIERS INSTALLED IN ENGLAND

The following is an extract from the London METAL INDUSTRY of July 1938 in regard to copper-oxide plate rectifiers as used in England:

"An installation of Westinghouse Metal Rectifiers for electro-deposition power supply has been made at the London Works of Fescol Ltd., electro-chemical depositors and engineers. No less than 15 separate sets are in use giving a total output of 16,500 amperes, and nine of these rectifiers each have an output of 12 volts, 1500 amperes. There are nine such sets in this room and they are used for heavy deposition of engineering chromium. The other rectifier equipments are situated in another room.

All the rectifier sets are completely remote-controlled from the actual vats, the range of control on each of the nine 12 volt, 1500 ampere equipments being from the maximum of 12 volts in 10 steps down to a minimum of 4 volts. No foundations were required when installing the rectifiers—they were simply placed into position and wired up. Only after severe tests was it decided to adopt Westinghouse metal rectifiers for this work, as, owing to the particular nature of the Company's business, the equipment has to work day and night throughout the year."

Demands are rapidly increasing in this country for H-VW-M Copper-Oxide plate rectifiers and those who have not as yet investigated this source of direct current supply should send for our bulletin giving complete information on this new product.

SINCE 1820 . . . . OUT AHEAD

Each product bearing the H-VW-M trademark reflects quality, expert workmanship and dependable performance. Collectively they are the result of 118 years of experience in the manufacture of electroplating and polishing equipment and supplies. They form a part of the continued pioneering work in design and manufacture which has kept Hanson-Van Winkle-Munning equipment in the lead for so many years.

Abrasives
Anodes
Filter Bags
Brushes
Buffs
Burnishing Barrels
Centrifugal Dryers
Chemicals
Cleaners
Compositions
Conveyors
Dipping Baskets
Galvanizing Flux
Generators
Generator Control Panels
Generator Brushes
Glue
Kote-Rax
Lathes
Nickel Brightener
Plating Barrels
Plating Processes
Bright Nickel
Bright Zinc
Cadmium
Plating Rectifiers
Rheostats—Tank
Soap Tanks
Tinning Flux
Wheels

CHANDEYSSON

Used

Plating Generators

and other makes

Large Stock

All offers subject to prior sale

•

Send specific inquiries

We have no stock list

•

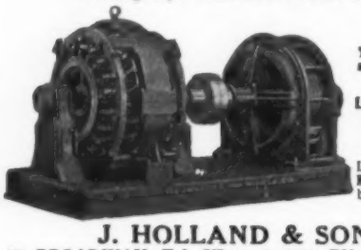
PAN ELECTRIC MFG. CO.

Gravois & Bingham Aves.

St. Louis, Mo.

BUSINESS WANTS For Sale—Equipment and Supplies

REBUILT AND GUARANTEED
POLISHING AND PLATING EQUIPMENT
Plating Dynamos and Motor Generator Sets



All Sizes Carried in Stock

Tumbling and Plating Barrels and most anything for the Plating Shop.

Largest Stock of Rebuilt Polishing and Plating Supplies in America

Let us have your requirements. Entire plants or parts thereof bought for cash. Send us list with prices.

J. HOLLAND & SONS, INC.
489 BROADWAY Tel. STagg 2—5128, EV. 7—8989 BKLYN., N. Y.

MOTOR GENERATOR SETS
NEW AND REBUILT

1—M-G Set, 2500 Amps., 6 Volts.
1—M-G Set, 1500 Amps., 6 Volts.
1—M-G Set, 750 Amps., 6 Volts.
10—Optimus M-G Sets, 200 Amps., 6 Volts, Panelboards. (New).
2—Optimus M-G Sets, 150 Amps., 6 Volts. (New).
1—Belted Generator, 500 Amps., 6 Volts.
1—Belted Generator, 2000 Amps., 6 Volts.

All Above Subject to Prior Sale

BEAM-KNODEL, INC.
195 Lafayette St., N. Y. City

FOR SALE

Generator set—2500 amp.—good condition. Generator G. E. 426531, 6-12 volt, 1150 RPM, amps 2500. Motor G. E. 520833, type 1, form K, 60 cycle, 220 volt, 3 phase, 25 H. P., 1200 RPM. The above set includes base and V-belt driven exciter. Bargain.
Auto City Plating Co., 3456 Denton Avenue, Detroit, Mich.

FOR SALE

Zeh & Hahnemann No. 20 Patent Percussion Power Press, Perfect Condition. Bach Products, Inc., 288 East 18th Street, Paterson, New Jersey.

Wanted—Equipment and Supplies.

INDUSTRIAL METAL CO., INC.
85-91 HYATT AVENUE NEWARK, N. J.

WANTED: Plating Room Scrap

ANODES
Baskets — Racks — Hangers — Peelings — Sludges — Tank Settlings — Residues of every kind.

SUBSIDIARY OF
HUDSON SMELTING & REFINING COMPANY
NEWARK, N. J.
J. W. PATERSON, President

WANTED—

We want your used and worn buffs regardless of size—send sample.

MICHIGAN BUFF CO., INC.
4054 Beaufait Ave., Detroit, Mich.

We are interested in handling plating equipment and supplies in Canada and are particularly interested in the following: Tripoli, Emery Paste, all grades of Turkish Emery, Artificial Abrasives, Nickel Plate Finish, Single Nickel Salts, Double Nickel Salts, Chromic Acid, Buffs, Anodes 95, 97 and 99% pure, Pumice Stone in lump, Bright Nickel Solutions, Anti-Pitting Solutions.

International Machy. Co., 73 Robert St., Hamilton, Canada.

SITUATIONS WANTED

CIVIL ENGINEER formerly director in charge of sales for large European International concerns for many years desires the representation for Europe of U. S. manufacturer in the electrical, machine or armament industry.

Address Civil Engineer, care of Metal Industry.

CHEMICAL ENGINEER

SITUATION WANTED—Chemical Engineer with thorough knowledge, ability and experience in all phases of electroplating. Fully qualified to install, supervise and control a shop of any size. Capable of doing research and development work to meet need and requirement of any delicate engineering problem. Unquestionable character and come well recommended. Eastern location only.

Supervisor, care of Metal Industry

STAINLESS STEEL POLISHER

Situation Wanted—My new exclusive method of polishing stainless steel produces a mirror finish with no more labor than Brass or Aluminum. The finish looks like chrome plate. 18 years experience polishing metals.

Stainless Steel, care of Metal Industry.

FOREMAN PLATER

SITUATION WANTED—Plating Foreman, 25 years with large fixture manufacturer, seeks employment with moderate size factory because of internal changes in present organization. Thoroughly experienced with all solutions and finishes.

Box 25, care of Metal Industry.

BUSINESS WANTS For Sale—Equipment, Etc.

FOR PLATING PRODUCTS SALE

1—1500/750 Ampere, 6/12 Volt HANSON-VAN WINKLE Motor Generator Set. With full control panel.

1—750 Ampere, 6 Volt ZUCKER-LEVITT & LOEB Motor Generator Set. Excellent condition. With full control equipment.

1—500 Ampere, 6 Volt HANSON-VAN WINKLE Motor Generator Set. Excellent condition.

Also a number of smaller generators and motor generator sets—lathes—plating barrels, etc.

PLATING PRODUCTS COMPANY
352 Mulberry St. **Newark, N. J.**

FOR SALE

1—5000/2500 Ampere, 6/12 Volt, HANSON-VAN WINKLE-MUNNING CO. Motor Generator Set, excellent condition throughout, like new and complete with full controlling apparatus.
1—3000/1500 Ampere, 12/24 Volt, CHAS J. BOGUE ELECTRIC CO. Motor Generator Set, excellent condition, complete with full controlling equipment.
1—2000/1000 Ampere, 6/12 Volt, HANSON-VAN WINKLE-MUNNING CO. Motor Generator Set, perfect condition, with full controlling equipment.
1—1500/750 Ampere, 12/24 Volt, HANSON & VAN WINKLE CO., INTERPOLE-TYPE, Motor Generator Set. Excellent shape, complete with Panel-Board arrangement.
1—1000/500 Ampere, 12/24 Volt, HANSON & VAN WINKLE CO. INTERPOLE-TYPE, Motor Generator Set. Excellent condition throughout, with Controlling equipment.
3—800/400 Ampere, 6/12 Volt, HANSON & VAN WINKLE CO. Motor Generator Sets. Excellent condition, with controlling equipment.

MANY OTHER SIZES IN STOCK

BAIRD & ABBOTT—Burnishing and Tumbling Barrels, Polishing Lathes, Rheostats, Ammeters, Blowers, Tanks, Polishing Wheels and many other items for the Plating and Polishing Department.

WRITE FOR DETAILS

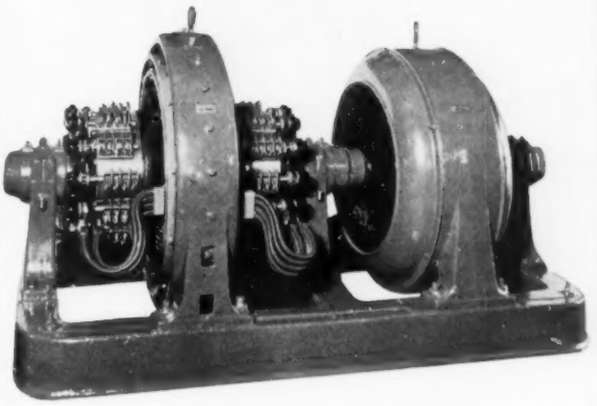
M. E. BAKER COMPANY
79-81 Haverhill St. Boston, Mass.

FOR SALE — PLATING GENERATORS

6-12 Volt, 600-300 Amp. 4 Pole, Double Commutator, Hanson-Van Winkle, composition brushes, self excited, with rheostat $145.00.
15 Volt, 1200 Amp. 6 pole, 450 R.P.M. self excited generator, with rheostat $375.00.

ELECTRICAL SURPLUS COMPANY
1885 Milwaukee Ave. Chicago

Plating Generator BARGAIN!



This is an actual photograph of a 5000/2500 ampere 6/12 volt 514 R.P.M. Eager plater with 220/440 volt 3 phase, 60 cycle synchronous motor, completely overhauled and tested in our shop.

This unit will cost you approximately one half that of new equipment. And we guarantee this equipment to perform to your satisfaction. Write, wire or phone for prices on all sizes platers from 50 amp. up.

THE MOTOR REPAIR & MFG. CO.
1555 Hamilton Ave. Cleveland, Ohio

USED BUFFS

64-68—1⅛" arbor—20 ply

Full disc—Loose—or Sewed

Thousands of every size.

8"—8c each 9"—9c each
10"—12c each

MICHIGAN BUFF CO., Inc.
4054 Beaufait Avenue Detroit, Mich.

FOR SALE CHEAP

1 Haveg Acid Resistant Tank 76" x 46", 35" deep. 6 Barrels Cryolite. 25 bags assorted shades, Chicago Vitreous Enamel Frits. 1500 Pounds Powdered Calcium Fluoride. Lasting Products Co., 202 South Franklin Town Rd., Baltimore, Md.

SITUATIONS OPEN

COMPOSITION SALESMAN

Situation Open—Experienced man who can sell a high grade buffing and polishing composition line. Must have an established trade in Indiana, Michigan and Ohio.

High Grade Composition, care of Metal Industry.

BUSINESS WANTS For Sale—Equipment and Supplies.

ESTABLISHED 1909

BUYERS OF SCRAP

(ANY QUANTITY FROM 100 LBS. UP)

NICKEL ANODES CADMIUM ANODES

Discarded Hooks—Racks—Baskets—Hangers—Nickel Strippings and Peelings—Drosses—Residues—Oxides—Sediments—Metallic Residues and By-Products—Monel—Nickel—Inconel—Stainless Steels. Guaranteed Immediate Cash Returns.

METALLURGICAL PRODUCTS COMPANY

CONVERTORS, RECLAIMERS AND MANUFACTURERS

35th & Moore Streets Philadelphia, Pa.

BUFFS WANTED

YOUR USED BUFFS ARE WORTH MONEY

Submit Samples

J. JACOBS

8 East 41st St., New York

Room 802

SITUATIONS WANTED

MR. METAL PLATING EXECUTIVE!!!

Why not improve your electro plating department? How? By utilizing the skill and knowledge of a competent and versatile plating chemist whose broad experience in production, development and research guarantees real results. Write to Box 304, care of Metal Industry.

FOREMAN PLATER

SITUATION WANTED—By a foreman plater who has had a wide range of practical experience in the electrodeposition of metals. Am thoroughly familiar with modern developments in the deposition of special and standard finishes, including gold, rhodium, chromium, bright silver, bright nickel, bright brass, bright cadmium, bright zinc, tin and copper. Have a thorough practical experience with all solutions in still as well as barrels and mechanical moving cathode tanks, also barrel tumbling, ball burnishing and oxidizing. Am capable of producing deposits of unusual brightness, and control solutions by chemical analysis. The applicant has initiative and is a man of good judgment in both the handling of help as well as material. High-grade references submitted.

Address Brightplate, care of Metal Industry.

PLATING SUPERINTENDENT

SITUATION WANTED—PLATING EXECUTIVE—45 years old, 30 years plating experience and installing departments. Have handled production of casket hardware, lighting fixtures, jewelry, and metal novelties. Desires position as department superintendent or foreman. Can furnish many fine references. Location unimportant.

Address Experienced Plater, care of Metal Industry.

CHEMIST-PLATER

POSITION WANTED—CHEMIST-PLATER—graduate chemist with 7 years actual plating experience. Can build up, operate, and control plating solutions such as zinc, chromium, nickel, bright nickel, die-cast nickel, copper, tin, lead, cadmium, still and barrel plating, silver, gold, etc; Desires position as manager, foreman, or analytical chemist in metal finishing department of responsible concern. Location, New England States, New York or New Jersey.

Address Chemist-Plater, care of Metal Industry.

EXPERT PLATER

SITUATION WANTED by expert plater with 20 years of practical and theoretical experience with all now known plating solutions and finishes on all kinds of metal. Executive ability. High grade references.

Experience, care of Metal Industry.

CHROMIUM PLATER

SITUATION WANTED—Plater who has specialized in chromium. Would like to locate in Connecticut.

Address H. S., care of Metal Industry.

PRACTICAL PLATER

SITUATION WANTED—Practical electro-plater with 7 years experience on the methods of plating and analyzing all common metals. Have also taken a general electroplating course at Columbia under Dr. C. B. F. Young. Can travel.

Address R. M. R., care of Metal Industry.

METAL FINISHER

SITUATION WANTED—METAL FINISHER—Can specify methods, equipment, set it up, put it in operation; make and control solutions; supervise production for the polishing, plating, enameling and lacquering of various metal products.

Address Metal Finisher, care of Metal Industry.

PRACTICAL PLATER

Practical Plater, all solutions. Lamps, Silverware manufacturing and Job Shop experience. Production man with executive ability, understands Polishing and Lacquering. Desires connection in or near New York.

Practical, care of Metal Industry.

EXPERIENCED PLATER

SITUATION WANTED—PLATER—Experienced on Chromium, Nickel, Brass, Copper and oxidized finishes. Can handle men. Can operate and control plating solutions.

Address References, care of Metal Industry.

ADVERTISERS' PRODUCTS

To Locate Advertisements of Firms Listed Refer to Alphabetical Index Page 32*

(Advertisers are entitled to one listing for each sixteenth page of space

ABRASIVES (Also see Emery)
Abrasive Co., Phila., Pa.
Keystone Emery Mills, Phila., Pa.
Stevens, Inc., Frederic B., Detroit, Mich.
Udylite Co., The, Detroit, Mich.
U. S. Galvanizing & Plating Equip. Corp., Brooklyn, N. Y.

ACID PIPE
Belke Mfg. Co., Chicago, Ill.

ACID PROOF PIPE
Belke Mfg. Co., Chicago, Ill.

ACIDS
Boracic, Chromic, Hydrofluric
E. I. Du Pont de Nemours & Co., Inc., Electroplating Division, Wilmington, Del.
General Chemical Co., Philadelphia, Pa.
Harshaw Chemical Co., The, Cleveland, O.
Mutual Chemical Co. of America, New York, N. Y.

AGITATORS FOR PLATING SOLUTIONS
Mechanical
Belke Mfg. Co., Chicago, Ill.

AIR & DYNAMIC BLAST
Greisback Eng. Corp., Yonkers, N. Y.

ALUMINUM (Sheets, etc.)
Seligman & Co., Inc., Arthur, New York
Strahs Aluminum Co., New York

ALUMINUM CEMENT
Smooth-On Mfg. Company, Jersey City, N. J.

ALUMINUM CLEANER
Gumm Chemical Co., Inc., Frederic, Kearney, N. J.
International Chemical Co., Phila., Pa.
Magnus Chemical Co., Garwood, N. J.
Magnuson Products Corp., Brooklyn, N. Y.

ALUMINUM INGOT
Seligman & Co., Inc., Arthur, New York

AMYL ACETATE
Egyptian Lacquer Mfg. Co., New York, N. Y.
Maas & Waldstein Co., Newark, N. J.
Roxalin Flexible Lacquer Co., Elizabeth, N. J.
Zapon Company, Stamford, Connecticut.

ANODES
All Metals—Brass, Bronze, Cadmium, Copper, Lead, Nickel, Tin and Zinc
E. I. Du Pont de Nemours & Co., Inc., Electroplating Division, Wilmington, Del.
Hanson-Van Winkle-Munning Co., Matawan, N. J.
Harshaw Chemical Co., The, Cleveland, O.
Lasalco, Inc., St. Louis, Mo.
McGean Chemical Co., The, Cleveland, Ohio
Munning & Munning, Newark, N. J.
Udylite Co., The, Detroit, Mich.
U. S. Galvanizing & Plating Equip. Corp., Brooklyn, N. Y.
Copper
Stevens, Inc., Frederic B., Detroit, Mich.
Silver
Handy & Harman Co., New York
Zinc
International Chemical Co., Phila., Pa.

ANNEALING FURNACES
Electric Furnace Company, Salem, Ohio.

ANTI CORROSIVE FINISHES
Egyptian Lacquer Mfg. Co., New York, N. Y.
Maas & Waldstein Co., Newark, N. J.
Roxalin Flexible Lacquer Co., Elizabeth, N. J.
H. V. Walker Co., Elizabeth, N. J.

AUTOMATIC METAL CLEANING MACHINES
Kansohoff, Inc., N., Cincinnati, O.

AUTOMATIC POLISHING MACHINES
Acme Mfg. Co., Detroit, Mich.
Lupomatic Tumbling Machine Co., Inc., New York, N. Y.
Frederic B. Stevens, Inc., Detroit, Mich.

AUTOMATIC WIRE AND SHEET METAL WORKING MACHINERY
Baird Machine Co., The, Bridgeport, Conn.

BALL BURNISHING EQUIPMENT
Abbott Ball Co., The, Hartford, Conn.
Baird Machine Co., The, Bridgeport, Conn.
Hanson-Van Winkle-Munning Co., Matawan, N. J.
Hartford Steel Ball Co., Hartford, Conn.
Lasalco, Inc., St. Louis, Mo.
Kansohoff, Inc., N., Cincinnati, O.
Udylite Co., The, Detroit, Mich.
U. S. Galvanizing & Plating Equip., Brooklyn, N. Y.

BALLS (Steel Burnishing, also Cones, Pins, Slugs)
Abbott Ball Co., Hartford, Conn.
Hartford Steel Ball Co., Hartford, Conn.

BASKETS, DIPPING
E. I. Du Pont de Nemours & Co., Inc., Electroplating Division, Wilmington, Del.
Hanson-Van Winkle-Munning Co., Matawan, N. J.
International Nickel Co., New York, N. Y.
Kirk & Blum Mfg. Co., Cincinnati, Ohio
Udylite Co., The, Detroit, Mich.
U. S. Galvanizing & Plating Equip. Corp., Brooklyn, N. Y.

BILLET HEATING FURNACES
Electric Furnace Company, Salem, Ohio.

BLAST GATES — BLOWERS AND EXHAUSTERS — BLOWER SYSTEMS
Kirk & Blum Mfg. Co., Cincinnati, Ohio

BLOW PIPE SYSTEMS
Kirk & Blum Mfg. Co., Cincinnati, Ohio

BLOWERS AND BLOW PIPING (See also Fans.)
Astle, H. J., Co., Providence, R. I.
Kirk & Blum Mfg. Co., Cincinnati, Ohio

BOLTS, MONEL METAL
International Nickel Co., New York, N. Y.

BRASS CEMENT
Smooth-On Mfg. Company, Jersey City, N. J.

BRASS FINISHERS' SOAP
Magnus Chemical Co., Garwood, N. J.

BRASS MILL PRODUCTS
Seymour Mfg. Co., Seymour, Conn.

BRASS; SHEET, WIRE, ROD, TUBE (Also see Rods and Bars, Sheets; Strip Metals; Wire, Etc.)
Bristol Brass Corp., The, Bristol, Conn.
Waterbury Rolling Mills, Inc., Waterbury, Conn.

BRIGHT-ANNEALING FURNACES
Electric Furnace Company, Salem, Ohio.
Hanson-Van Winkle-Munning Co., Matawan, N. J.

OXY-DY-ZENE
THE STRONGEST POSSIBLE
OXIDIZING AGENTS
Sold in LUMP and LIQUID--in Original Sealed Packages Only-By Leading Plater Supply Houses.
MANUFACTURED FOR 61 YEARS BY
KREMBS & COMPANY
669 W. OHIO ST. CHICAGO, U.S.A.

CHROMIUM PLATING
SCREWS—RIVETS—
WASHERS
SMALL PARTS, ETC.
THE CHROMIUM PROCESS CO.
Shelton, Conn.

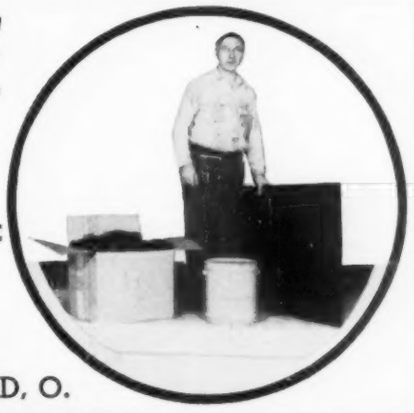
KOST KUTTER
CUT
COLOR
ALLIED P CO.
BUFF
GUARANTEED SATISFACTION
For full details write
ALLIED INDUSTRIAL PRODUCTS CO.
17 N. Elizabeth Street, Chicago, Ill.

*When writing to advertisers please mention METAL INDUSTRY

For a real good polishing job use
KEYSTONE EMERY
Write for Sample
KEYSTONE EMERY MILLS, 4318 Paul St., Phila., Pa.

Wire-Working Machinery
Wire Mill Equipment
Sleeper & Hartley, Inc.
Designers and Builders
Worcester, Massachusetts

NEW TANK LINING MATERIAL
PLAST-O-LINE
Low cost! Anyone can apply
For ACID and ALKALI
TANKS OF STEEL, WOOD OR CONCRETE
Write for data and free sample
HEIL & COMPANY
3088 W. 106th ST. CLEVELAND, O.



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(Advertisers are entitled to one listing for each sixteenth page of space)

Zialite

Reg. U. S. Pat. Off.

THE ONE

Nickel-plating Solution

FOR 100

Plating Problems

also

Bright Copper Solution

Write today for full particulars

ZIALITE CORPORATION

10 N. Bleecker St.

Mt. Vernon, N. Y.

PEERLESS PRODUCTS

POLISHING WHEELS

Every size, shape and description for every purpose

GEORGE A. STUTZ MFG. CO.

1647 Carroll Ave. Chicago, Ill.

Plating and Polishing Equipment and Supplies

PLATERS SPECIALTIES

Investigate the "Simplicity" Line.

ANODE HOOKS—Positive screw contact for lead anodes for chrome.

HEATER—Electric. Lead covered. Used overnight will prevent excessive chilling of nickel solution. Operates on lighting circuit.

WETTING AGENT—For eliminating pitting of nickel deposits in cold solutions. Can also be used to obtain smoother deposits from acid copper solutions.

ELECTROPLATERS ENGINEERING CO.

93 Lafayette St. Newark, N. J.

HERE IS A

COMPLETELY AUTOMATIC PROCESS

FOR FINISHING ALL METALS TO A HIGH GRADE LUSTRE

at a saving of from 60% to 92%.

Let us demonstrate this money saving process to you GRATIS.

LUPOMATIC TUMBLING MACHINE CO., INC.

4515 Bronx Blvd. New York, N. Y.

BRIGHT NICKEL FILTERS
Belke Mfg. Co., Chicago, Ill.

BRIGHT NICKEL SOLUTION
Hanson-Van Winkle-Munning Co., Matawan, N. J.
Bright Nickel Corp., Detroit, Mich.

BRUSHES
Bogue Electric Co., West Paterson, N. J.
Hanson-Van Winkle-Munning Co., Matawan, N. J.
Udylite Co., The, Detroit, Mich.
U. S. Galvanizing & Plating Equip. Corp., Brooklyn, N. Y.

BUFFING COMPOUND CLEANERS
Allied Industrial Products Co., Chicago, Illinois
Belke Mfg. Co., Chicago, Ill.
Gumm Chemical Co., Inc., Frederic, Kearney, N. J.
International Chemical Co., Phila., Pa.
Magnus Chemical Co., Garwood, N. J.
Magnuson Products Corp., Brooklyn, N. Y.
Oakite Products, Inc., New York, N. Y.
Philadelphia Quartz Co., Philadelphia, Pa.

BUFFING AND POLISHING COMPOSITIONS
Allied Industrial Products Co., Chicago, Illinois
Beam-Knodel, Inc., New York
Belke Mfg. Co., Chicago, Ill.
Bias Buff & Wheel Co., Inc., The, Jersey City, N. J.
Hanson-Van Winkle-Munning Co., Matawan, N. J.
Harrison & Co., Haverhill, Mass.
Lea Mfg. Co., The, Waterbury, Conn.
Chas. F. L'Hommedieu & Sons Co., Chicago, Ill.
Matchless Metal Polish Co., Chicago, Ill. and Glen Ridge, N. J.
Oriental Rouge Co., Bridgeport, Conn.
Plating Products Co., Newark, N. J.
Frederic B. Stevens, Inc., Detroit, Mich.
Udylite Co., The, Detroit, Mich.
U. S. Galvanizing & Plating Equip. Corp., Brooklyn, N Y.

BUFFING AND POLISHING MACHINES
Acme Mfg. Co., Detroit, Mich.
Frederic B. Stevens, Inc., Detroit, Mich.
Udylite Co., The, Detroit, Mich.
U. S. Galvanizing & Plating Equip. Corp., Brooklyn, N. Y.

BUFFING MACHINES, AUTOMATIC (Also see Polishing Lathes and Heads.)
Acme Mfg. Co., Detroit, Mich.

BUFFING AND POLISHING WHEELS (Also See Buffs.)
Canvas, Cotton, Etc.
Allied Industrial Products Co., Chicago, Illinois
Bias Buff & Wheel Co., Inc., The, Jersey City, N. J.
Hanson-Van Winkle-Munning Co., Matawan, N. J.
Lea Mfg. Co., The, Waterbury, Conn.
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Munning & Munning, Newark, N. J.
Oriental Rouge Co., Bridgeport, Conn.
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Philadelphia Quartz Co., Philadelphia, Pa.

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Baird Machine Co., The, Bridgeport, Conn.

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McGean Chemical Co., The, Cleveland, Ohio

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Kirk & Blum Mfg. Co., Cincinnati, Ohio
Lasalco, Inc., St. Louis, Mo.

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Lasalco, Inc., St. Louis, Mo.
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Motor Repair & Mfg. Co., The, Cleveland, Ohio

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Holland & Sons, Inc., Brooklyn, N. Y.
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Lasalco, Inc., St. Louis, Mo.
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Stevens, Inc., Frederic B., Detroit, Mich.
Udylite Co., The, Detroit, Mich.
U. S. Galvanizing & Plating Equip. Corp., Brooklyn, N. Y.

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ELECTRO PLATING JOB & CONTRACT
see Polishing and Burnishing; Plating, Barrel Method.)
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Hauser Stander Tank Co., Cincinnati, Ohio
Lasalco, Inc., St. Louis, Mo.
Stevens, Inc., Frederic B., Detroit, Mich.
Udylite Co., The, Detroit, Mich.
U. S. Galvanizing & Plating Equip. Corp., Brooklyn, N. Y.

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ENAMELING OVENS
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Zapon Company, Stamford, Connecticut.
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Maas & Waldstein Co., Newark, N. J.
Roxalin Flexible Lacquer Co., Elizabeth, N. J.
Walker, H. V., Elizabeth, N. J.
Zapon Company, Stamford, Connecticut.
Wood
The Clinton Co., Chicago, Ill.
Egyptian Lacquer Mfg. Co., New York, N. Y.
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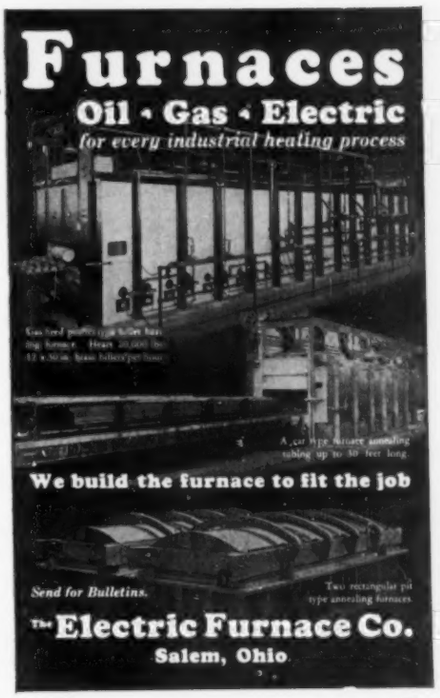
Roxalin Flexible Lacquer Co., Elizabeth, N. J.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Zapon Company, Stamford, Connecticut.

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International Chemical Co., Phila., Pa.
Magnuson Products Corp., Brooklyn, N. Y.
Oakite Products, Inc., New York
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Rumford Chemical Co., Rumford, R. I.
Udylite Co., The, Detroit, Mich.
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Hanson-Van Winkle-Munning Co., Matawan, N. J.
Lasalco, Inc., St. Louis, Mo.
U. S. Galvanizing & Plating Equip. Corp., Brooklyn, N. Y.

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Seymour Mfg. Co., Seymour, Conn.

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Electric Furnace Company, Salem, Ohio.

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*When writing to advertisers please mention METAL INDUSTRY

ADVERTISERS' PRODUCTS

To Locate Advertisements of Firms Listed Refer to Alphabetical Index Page 32*

(Advertisers are entitled to one listing for each sixteenth page of space)

OVENS—JAPANNING
Kirk & Blum Mfg. Co., Cincinnati, Ohio

OVENS—INDUSTRIAL
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OXIDIZING SOLUTIONS
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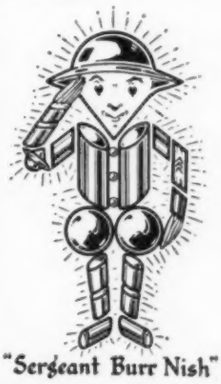

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Hanson-Van Winkle-Munning Co., Matawan, N. J.
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Lupomatic Tumbling Machine Co., Inc., N. Y.
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Baird Machine Co., The, Bridgeport, Conn.

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E. I. Du Pont de Nemours & Co., Inc., Electroplating Division, Wilmington, Del.
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*When writing to advertisers please mention METAL INDUSTRY

«« INDEX TO ADVERTISERS »»

A

Abbott Ball Co., Hartford, Conn. 591
Abrasive Co., Phila, Pa. 596
Acme Mfg. Co., Detroit, Mich. 587
Allied Industrial Products Co., Chicago, Ill. .. 27
American Nickeloid Co., Peru, Ill. 595

B

Baird Machine Co., The, Bridgeport, Conn. .. 20
Baker, M. E. Co., The, Boston, Mass. 25
Beam-Knodel, Inc., New York 24
Belke Manufacturing Co., Chicago, Illinois .. 7
Bias Buff & Wheel Co., Inc., The, Jersey, City, N. J. 12
Bogue Electric Co., West Paterson, N. J. .. 597
Bright Nickel Corp., Detroit, Mich. 15
Bristol Brass Corp., The, Bristol, Conn. 33
Bruce Products Corp., Detroit, Mich. 3
Buckeye Products Co., Cincinnati, Ohio 594

C

Campbell, Hausfeld Co., Harrison, Ohio 589
Chromium Process Co., Shelton, Conn. 27

D

Dellinger Mfg. Co., Lancaster, Pa. 589
E. I. Du Pont de Nemours & Co., Inc., Wilmington, Del. 11

E

Egyptian Lacquer Mfg. Co., New York 592
Electric Furnace Co., Salem, Ohio 29
Electroplating Eng. Co., Newark, N. J. 28

F

Ford, J. B., & Co., Wyandotte, Mich. 10
Frank, Paul, New York 597

G

General Chemical Co., Camden, N. J. 33
Gumm Chemical Co., Inc., Frederick, Kearney, N. J. 594

H

Handy & Harman, New York City 6
Hanson-Van Winkle-Munning Co., Matawan, N. J. 21, 22
Harrison & Co., Haverhill, Mass. 588
Harshaw Chemical Co., The, Cleveland, Ohio 586
Hartford Steel Ball Co., Hartford, Conn. .. 29
Heil & Co., Cleveland, Ohio 27
Hauser Stander Tank Co., Cincinnati, Ohio .. 592
Holland & Sons Inc., Brooklyn, N. Y. 24

I

Industrial Filter & Pump Mfg. Co., Chicago, Ill. 594
Industrial Metal Co., Newark, N. J. 24
International Chemical Co., Philadelphia, Pa. ..... Back Cover
International Nickel Co., New York, N. Y. .. 581

K

Keystone Emery Mills, Phila., Pa. 27
Kirk & Blum Mfg. Co., Cincinnati, Ohio .. 593
Kocour Co., Chicago, Ill. 596
Krembs & Co., Chicago, Ill. 27

L

Lasalco, Inc., St. Louis, Mo. 14
Lea Mfg. Co., The, Waterbury, Conn. 1
L'Hommedieu & Sons Co., Chas. F., Chicago, Ill. 12
Linick, Green & Reed, Inc., Chicago, Ill. .. 591
Lupomatic Tumbling Mach. Co., New York, N. Y. 28

M

MacDermid, Incorporated, Waterbury, Conn.. 9
Magnus Chemical Co., Garwood, N. J. 584
Magnuson Products Corp., Brooklyn, N. Y.. 597
Matchless Metal Polish Co., Chicago, Ill., and Glen Ridge, N. J. 591
McAleer Mfg. Co., Detroit, Michigan 29
McGean Chemical Co., Cleveland, Ohio 599
McVittie Pltg. & Brass Refinishing Co., Chicago, Ill. 33
Metallurgical Products Co., Philadelphia, Pa. 26
Michigan Buff Co., Inc., Detroit, Mich. 24, 25
Motor Repair & Mfg. Co., The, Cleveland, Ohio 25
Munning & Munning, Inc., Newark, N. J. .. 18
Mutual Chemical Co. of America, New York, N. Y. 585

N

National Sherardizing & Mach. Co., Hartford, Conn. 29

O

Oakite Products, Inc., New York, N. Y. 4
Oriental Rouge Co., Inc., Bridgeport, Conn. .. 29

P

Pan Electric Mfg. Co., St. Louis, Mo. 23
Philadelphia Quartz Co., Philadelphia, Pa. .. 599
Plating Products Co., Newark, N. J. 25
Platt Bros & Co., The, Waterbury, Conn. .. 33
Powers Regulator Co., Chicago, Ill. 590

R

Ransohoff, Inc., N., Cincinnati, Ohio 595
Robinson & Sons, A., New York 583
Roxalin Flexible Lacquer Co., Inc., Elizabeth, N. J. 5

S

Schweizer, Chas., K., St. Louis, Mo. 33
Seligman & Co., Inc., Arthur, New York, N. Y. 33
Siefen Co., J. J., Detroit, Mich. 11
Sleeper & Hartley, Inc., Worcester, Mass. .. 27
Smooth-On Mfg. Co., Jersey City, N. J. .. 588
Stanley Chemical Co., East Berlin, Conn. 595
Stevens, Inc., Frederic B., Detroit, Mich. .. 13
Strahs Aluminum Co., New York 33
Stutz Mfg. Co., Geo. A., Chicago, Ill. 28

U

Udylite Co., Detroit, Mich. 17
United Chromium, Inc., New York 16

V

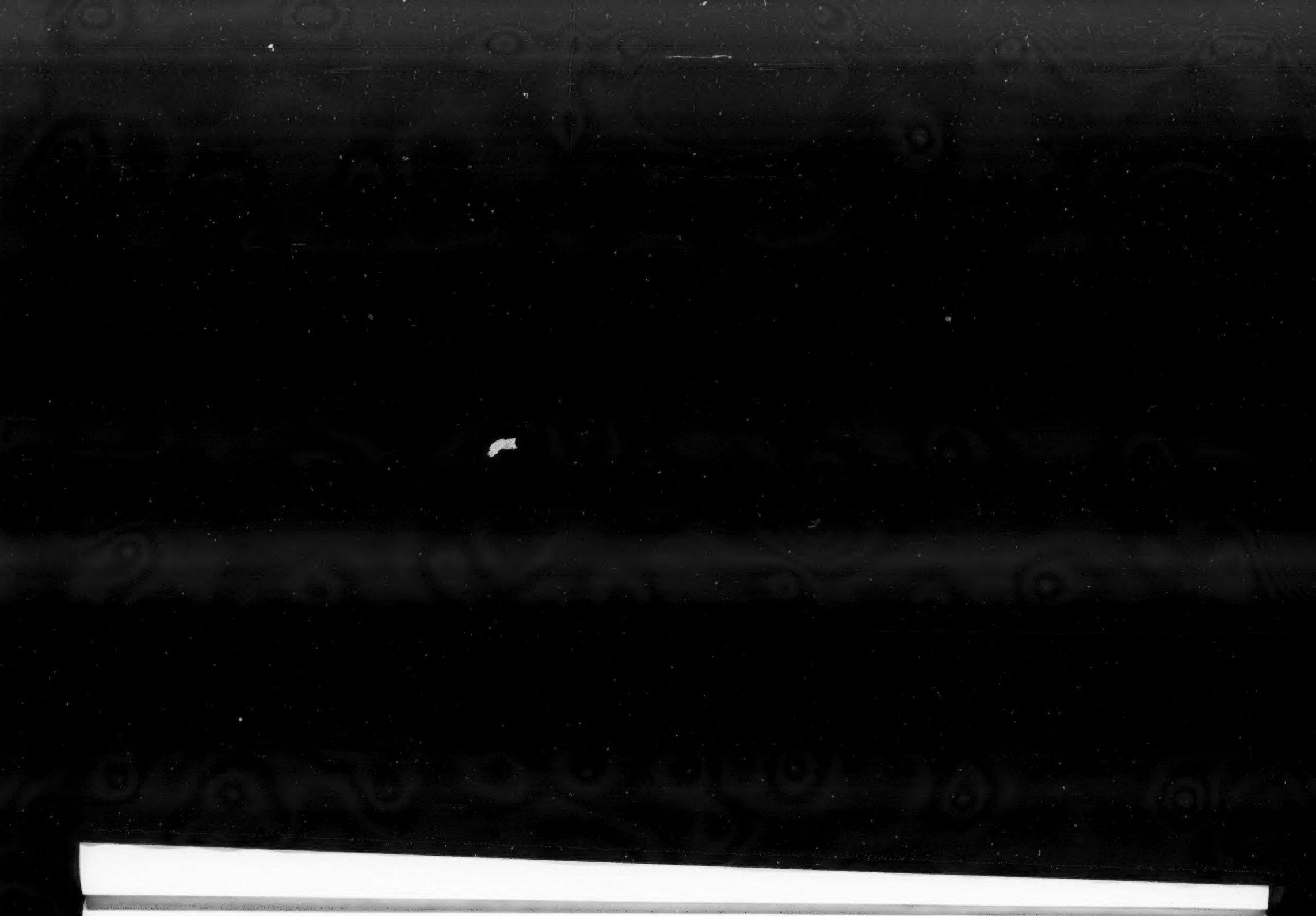
Vulcan Detinning Co., The, Sewaren, N. J. .. 29

W

Walker Co., H. V., Elizabeth, N. J. 590
Waterbury Rolling Mills, Inc., Waterbury, Conn. 33

Y

Yerges Mfg. Co., The, Fremont, Ohio 599

Z

Zapon Co., New York and Stamford, Conn... 2
Zeh & Hahnemann Co., Newark, N. J. 596
Zialite Corp., New York 28